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Agriculture

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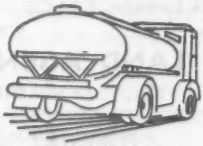

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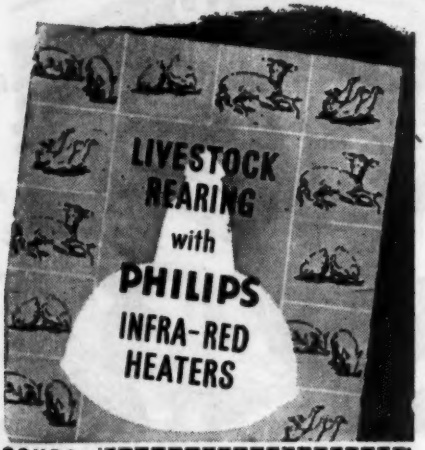

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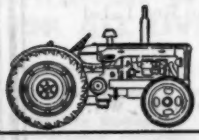

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VOL. LXII No. 3 JUNE 1955

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AGRICULTURE

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RURAL RIDES

RALPH WIGHTMAN

William Cobbett's rural rides over the years 1821 to 1832 took him to many parts of England. At the invitation of the B.B.C., Mr. Ralph Wightman re-visited some parts of that itinerary in the early part of this year, to record something of the changes that have come to the countryside in the past century and a quarter.

WHEN the B.B.C. suggested that I should follow the footsteps of Cobbett I jumped at the opportunity. The idea was that an actor should read a few paragraphs from *Rural Rides*, that I should say what I had seen 120 years later, and that recordings could be made of people I met. We were extremely lucky in our actor, because John Sharp not only has an authentic dialect from the Surrey-Hampshire border, but runs his own small farm. We were unlucky, in a way, because the original idea was for only three programmes, which were afterwards increased to fifteen. Consequently, we started with Cobbett's first journey to Berghclere near Newbury in an effort to give an impression of the book, whereas it might have been better to start the series with his birthplace at Farnham, Surrey, especially since he returned to die in the neighbourhood at Normandy, near Ash.

I was accompanied on my journeys by Doctor Eric Ewens, who was largely responsible for selecting the Cobbett extracts, and by either Francis Dillon or David Thomson, who were in charge of the B.B.C. production. I mention this because all three were generally more interested in the man Cobbett than in the differences in farming between 1820 and today. Had I been left to myself, I should probably have given a great deal more which would have appealed to readers of *Agriculture* but which would have bored the vast majority of listeners. On the whole, it was probably a happy combination. At any rate, I was converted to forgiving all Cobbett's pigheaded, wild arguments, and was quite conquered by the man himself. For that matter I started as a Cobbett lover and then turned against him a little. I admired his vigorous prose, even though I knew he was firmly convinced that frogs came down in rain and that horse hair turned into eels! Then, on the very first ride, confirmed later in the others, I discovered that nearly all the friends with whom Cobbett stayed were fairly prosperous people. Not only were they prosperous, but they were often not making their money from farming. His stories of their methods of transplanting Swedish turnips on his plan were frequently concerned with a very few acres.

First Day Out Cobbett liked good free quarters for the night, and he frequently got them from people whom we now call hobby farmers. The start was with Mr. Budd of Berghclere, where the old man had the grace to say "His is but miniature farming". The farm is still

called Budd's, and my host was Mr. Desmond Alexander. He told me that the farm was now 20 acres and that it was no bigger in Cobbett's day. Budd was a lawyer and, although the house had been enlarged since his time, enough of the old remains to make it certain that it was never the cottage one could have expected on 20 acres.

Travelling on, I found Rookery Farm, Hurstbourne Tarrant, to be a sizable place with a solid farmhouse and with "W.C. 1825" carved on the garden wall. This farm could certainly have supported the house, but it was quite a different story at Prosperous Farm, Shalbourne. Cobbett went to Prosperous as a pilgrimage to see where Tull had tried out his famous drill, and I saw the well into which the labourers had thrown this new-fangled invention. In Cobbett's time the house had been improved by a Mr. Blandy, who had business interests in Newbury. Since then it has been considerably enlarged, and I was entertained by the present owner, Colonel Wills. He showed me enough of the old house to make it certain that Mr. Blandy never lived from the 60 acres which was all the land attached to it when Cobbett came, and that "Prosperous" was a queer name for this indifferent soil.

Thus on the first day of my journey I found the old man being entertained by gentlemen farmers who were playing with the newest ideas in agriculture. It made me wonder how true Cobbett's picture might be of general farming. I wondered if I might give an equally false impression by describing hydroponics or humus farming, or the use of krilium. Yet in spite of this first day's journey and subsequent visits to similar establishments, I could never get away from his marvellous descriptions of the countryside. Without any knowledge of geology and without technical phrases, Cobbett had a wonderful knack of conveying the nature of the soil. "Spewy, barren sands" conveys at least as much to me as "Bagshot Beds". Then whenever he came to a chalk soil he was always complimentary to the countryside, which is exactly my own reaction, since I was reared on the chalk.

Perhaps it is fitting that we should both have made our journeys immediately after a great war; in fact, I suppose the war with Napoleon could be called the First World War more truly than that of 1914. At least it was the first war which caused an enormous sum of money to be paid by Parliament. The old wars had been financed by the kings, the great nobles and the church. There was always the chance of paying part of the cost from plunder and by living on the country. Weapons were relatively cheap and ships of war could be pirates or merchantmen between battles. Cobbett's Great War used modern arms which required factories to produce them and to maintain them. Vast numbers of paid soldiers were kept from productive work for many years. It was very different from the small companies who followed their feudal lord for a short time at the command of the king. I realize that this change had started in Tudor times, but the Napoleonic wars were the first time that expensive arms were used on such a scale.

The end of the Napoleonic war left much the same conditions which we experienced in 1919. Ex-service men came back to unemployment; factories which had been extremely busy on munitions were no longer needed, and a huge debt had been contracted on which interest had to be paid. The parallel between Cobbett in 1820 and my memories of 1921 was almost exact.

In 1954, after a third world war, I was setting out to see an England which did not seem to be conforming to 1820 or 1921. A national debt had been piled up so vast that ordinary men had given up trying to imagine what all the noughts meant on the ends of the millions. Yet there was full employment and no sign of the hardships of 1921. Possibly the solution is

that today the war has not ended, inasmuch that the young men are still conscripted for two years and that factories are pouring out new weapons. If that is the answer, the final settlement may be more terrible than anything Cobbett ever imagined.

I used that phrase "something Cobbett could never have imagined" fairly often in my radio descriptions of what I found in England. In a way it is fair enough because he could not have foreseen our road transport and its influence on the liquid milk trade, nor the town market for flowers, nor the possibilities of power farming, fertilizers, spraying and plant breeding. Looking back though, I hope it never sounded scornful of all his theories. He hated paper money, the National Debt, standing armies and the sprawling of the towns. His remedy was a return to the countryside and a dispersal to farm work of all the people who were doing useless things in the great cities. Certainly that is an impossible solution today, but the problems he stated are still with us.

Dislike of Big Farms Cobbett was essentially a smallholder in his thoughts, and over and over again we find him expressing hatred of the growing size of farms. Even when he liked the farmer in occupation of a big farm, he had to make his point that small farms kept many people well fed, whereas large ones meant one prosperous family and a lot of starving labourers This was the case with Mr. Hinton Bailey at Stoke Charity on the Hampshire-Wiltshire border. Cobbett admired the farming but insisted that there used to be ten holdings in the village instead of two. I found two farms, and a friend of mine, John Rowsell, in one of them. He confirmed my impression that nothing exists today to suggest that there ever were ten farms—no little clumps of buildings around scattered houses, nor anything of the sort. Still Cobbett said that the ten farms had become two in his day, and I can remember cobb-and-thatch buildings disappearing without trace within the last fifteen years. The old man may have been quite right in his facts, but what a difference in the people!

He claimed that the ten farms had kept "fifty well-fed people in this parish . . . And now all are half-starved, except the curate and the two families". None of Mr. Rowsell's workers showed the slightest sign of starvation, but this is a point I will leave for the moment.

Where Cobbett did not like the place or the owner, he was much more violent in denouncing the big farm. He did not like Great Bedwin near Marlborough because it was a rotten borough. His description was "a group of shabby houses upon a hill", but then even charming Marlborough was "an ill-looking place enough". I suspect it was due largely to Lord Aylesbury, who had made a great park at Savernake. "I suppose here are 50 or 100 farmers of former days swallowed up", remarked Cobbett.

It was that last phrase which took me to Great Bedwin, because I knew that between Cobbett's time and our own there had been a swallowing up of much more than 100 farms. This was not to form a park but to provide the first experiment in mechanized farming by a company. I believe I am reasonably accurate in giving 10,000 acres as the area farmed at the end of the last century by Stratton, Gauntlett and Farmer. I knew that descendants of the Gauntlett family still ran something in the neighbourhood of 1,000 acres at Little Bedwin and I went to see them.

The buildings are a curious mixture of the very old, like a granary on staddle stones, makeshift deserted cowstalls of the 1870-1921 depression, and the very last word in post-war modern implement sheds, milking parlours and mechanized feeding yards. There is the whole story here in buildings of

the prosperous times of Cobbett's war, the slump due to American grain from 1870, the struggle back with cows between 1919 and 1939, and the new prosperity of modern industrialized farming.

Steam-ploughing and Survival However, it was not modern mechanization that I was seeking. It was that strange tale of the early mechanization and the fantastically large farm. Mr. Gauntlett told me that it was based on the steam plough, and that this early source of power did very much what modern tractors are doing today. They tore out hedges, ploughed and cultivated much deeper than had ever been done before, and could catch up with the work in a bad season. Mr. Farmer and his partners took farm after farm at very low rents behind predecessors who had gone bankrupt. By joining farm to farm and by machines, they stopped a whole countryside from going derelict.

Cobbett would not have liked it. A great deal of grain was grown and the land was kept alive, but far less men were needed. The men on the steam ploughs were not half-starved. They were paid substantially more than farm workers and put in very long hours on piecework rates. I can remember such men in 1912 when ordinary farm workers were very near half starvation. Their faces were perpetually black from the oil and coal of the engines. Their earnings were roughly twice those of ordinary workers and allowed them to buy beer very freely. They spent most of their time away from home and were not regarded with favour by husbands or prospective husbands when they descended on a village for a week or two! Their language was rich, and in their cups they bellowed many interminable sad or bawdy folk songs.

Cobbett could not have foreseen that the survival of one part of farming in the Great Bedwin area would spring from steam engines.

It was fitting to move a little away from his route to Wexcombe and A. T. Hosier, because here is another side of mechanized farming. Mr. Hosier faced the running of a large chalk farm at a time when the steam ploughs were giving way to the tractor, but when no form of machine could make grain growing pay. The cowkeeper was just about holding his own on small family farms in the vales, but no ordinary man would have thought of keeping more than a small dairy near the existing buildings at Wexcombe. Much of the land was two miles from these buildings, largely unfenced and without shelter.

Everyone knows how Mr. Hosier tackled the problem, and looking back it all seems very obvious, like most strokes of genius. I am not concerned here with the brilliance of taking the shed to the cow, instead of the traditional method of taking the cow to the shed, but rather with the essential changes from Cobbett's time. The mechanization of milking was similar to the mechanization of cultivations, but Arthur Hosier introduced another thought. He bought cheap Irish heifers and made no attempt to secure very high milk yields. Other farmers tried to close the gap between returns and costs by increased returns through pedigree, milk recording and high feeding. In those pre-war days he made a profit by cutting costs. When the last war started he was more than ready to raise production but, at a time when few cared about English land, he made a living by milking cows with two men instead of five.

Depopulation Cobbett had a great deal to say about the depopulation of the English countryside. Arthur Hosier faced a land already depopulated. He may not have repopulated it to the level of 1820, but the men he employed were always paid above the rate of the times. When I

visited him he told me of a contract scheme which he is working now whereby the man in charge of 60 cows is paid so much per gallon. This man has to share with one assistant, and both are liable for their own insurance and income tax. But this is what Mr. Hosier said: "I've had chaps earn something like, between them, thirteen hundred pounds a year".

In the Avon Valley, the Wylye Valley and in the Lincolnshire Fens I was frequently brought up against Cobbett's contention that the countryside used to be more thickly populated. I know that in my own lifetime many people in the villages have left the land. A large proportion now work in towns, and villages remote from a bus route are smaller than they were forty years ago. Mechanization needs fewer manual workers, but food production is higher than ever before. Was there really depopulation in Cobbett's time? I doubted it very much until I followed him down the Avon Valley and saw a parish church every two miles.

Another point of which Cobbett made a great deal was that workers were better off in wooded districts like the New Forest and the Forest of Dean. Here there was wood for the gathering and often a chance of keeping a pig on acorns and wild nuts. In arable districts there was nothing, except possibly a little land for potatoes; and Cobbett did not regard potatoes as fit for food. Today, of course, the Agricultural Wages Board have levelled wages and very few cottagers gather fuel or keep pigs.

Unfamiliar Country I enjoyed the old man most when he was out of his country and I was out of mine. In Kent, Lincoln, Cambridge, Dean and Norfolk we were both looking at unfamiliar country. He said little about the Free Miners of Dean, who must have made a large contribution to country life in his day, and whom I found fascinating, especially their sheep in the glades. He described the thousands of sheep on Romney Marsh, which I found a puzzle inasmuch as they seemed reasonably clear of stomach worms. He did not see what Mr. Dennis Clifton from Lincoln has done to some of those endless pastures with a plough. In fact, when he was in the Lincoln Fens he talked of rich pastures and flocks of great fat sheep. This made me wonder if the whole of Romney will go to arable as the Fens have done.

On hops, at Farnham, he was much more knowledgeable than I am, but at least he never saw a hop-picking machine, nor dreamt of such labour-saving. Always he saw churches and cathedrals in decay, largely because he disapproved of the Reformation, although he called himself a member of the Church of England. I found Steeple Langford church, and Salisbury, Winchester and Ely cathedrals lovingly preserved and likely to remain for generations yet unborn.

Above all, I enjoyed Cobbett in his softer moods. He is magnificent when he describes bird-song at Barn Elms just over Hammersmith Bridge—which is still an open space. He compared it with the Fens where, he said, there were no song birds. This puzzled me because there are plenty today. Possibly the reason is that the Fens are now ploughed, and there are more trees along the roads and more fruit plantations.

I hope this is the explanation, because in nothing else did I find William Cobbett wrong in his descriptions, however strange some of his political teaching may sound to modern ears.

MANPOWER AND EGG PRODUCTION

HUGH FINN

Nackington, Canterbury

Out-of-date methods can cost the poultry-farmer up to 4*s.* per bird per year in extra labour costs, says Mr. Finn. The intensive unit, housed in a well-designed, labour-saving building, appears to be the answer for the specialist, although for the small man batteries are by no means outmoded.

ALTHOUGH profit margins in commercial egg production were pretty narrow in pre-war days, I can remember that we did not have to worry so very much about labour costs; at least, not in comparison with the other costs, such as food, involved in producing eggs. But circumstances are very different today, since it is possible for there to be a difference of as much as 4*s.* per bird per year in labour charges under different systems of housing and management. According to the statistics which are made available by the universities, some poultry farmers are making a profit of 10*s.* or more per bird, but the average would be far less than this, and therefore I think it is necessary for us to consider very carefully what means there may be of reducing labour costs in egg production in the future.

It is not difficult to explain how I arrive at that differentiation labour figure of 4*s.* per bird. There are a great many poultry units up and down the country where about 1,000 birds claim the full attention of a man, who costs in wages about £400 a year, or 8*s.* per bird. Yet, in a properly built, large-scale intensive house with labour-saving equipment, it is possible for one skilled man—paid, say, £600 a year—to look after 3,000 birds quite comfortably. The cost of labour in this case works out at only 4*s.* per bird per year.

There is, of course, nothing new in this business of keeping large numbers of birds intensively: it was tried unsuccessfully twenty or more years ago. But we have learnt a lot since then, not only about housing and equipment, but also in veterinary practice, and with these new aids it should be a much more reasonable proposition to have a successful large-scale intensive deep-litter unit of the size I mentioned.

Designing the Intensive Unit Unfortunately, we do not yet know much about the best methods of construction for the intensive house, although there are one or two broad rules by which we can go, such as the necessity for allowing not less than 3½, and possibly as much as 4 sq. feet of floor space per bird. Good insulation is also extremely important (particularly of the roof), since room temperature has a close bearing on the successful production of winter eggs and, of course, helps towards a better rate of food convertibility. Ventilation presents something of a problem, and probably the best solution is to have some form of forced draught ventilation which can be controlled under all conditions. But from the labour angle, the construction of the house can make or mar the possibility of really large numbers being dealt with by one man.

It would appear the most obvious thing to put in automatic feeders. Regrettably, however, a foolproof unit has not yet been invented, and so it looks, at the moment, as if the feeding procedure will need some hand work, at least for some time to come. Therefore, there is an advantage in having a central passage; for the worker does not want to have to take six steps where

one will do, and if the feeding, egg collection and other services can be done from a central or even a side passage, there is no doubt that it will save on wages. It helps, of course, to have a food hopper slung on overhead rails and filled from a food bin at the end of the house.

I would never advocate two-storey houses. I feel sure that the cost is too high, and designs have varied so noticeably in a period of 5-10 years that I would personally prefer to construct a building with materials which are not expected to have too long a length of life, provided they were proportionately less expensive for that reason.

I think it would be wrong to try and give the impression that batteries are finished. The self-employed man looking after a few poultry in his spare time is undoubtedly going to find the battery a tremendous asset. The factor which keeps this method of poultry housing to the fore is the recent practice of putting two birds to a cage. While everybody must accept the necessity for much more skill to achieve success if the numbers are doubled up, nevertheless it makes the battery quite a reasonable proposition from the capital point of view and, indeed, from the labour aspect too. Here again, however, mechanical aids do not seem to have been entirely successful, and the automatic methods of feeding have their snags. A well-laid-out battery house containing 2,000 birds would probably be a reasonable full-time job for an energetic and skilled man. This, then, is the halfway mark, at a labour cost of about 6*s*. per bird per year.

Saving Money on Rearing I see the future pattern of commercial egg production tending to show that the job will be in the hands of either the very small man keeping 200-300 birds as a sideline (very often looked after by the wife and family), or the specialist in a big way, who will, broadly speaking, be able to cut costs by mass production methods.

But what of the problem of replacement stock? Labour costs these days can enter very prominently into things when rearing chicks, although there are certain methods which undoubtedly do tend to save labour. If a few small batches are to be reared, there are possibly advantages to be gained from the use of tier brooders for the first 3-4 weeks, but they are by no means the most labour-saving method, particularly if there is plenty of floor space available for brooding with infra-red lamps. The objection to floor brooding in the past was, of course, that the litter had to be cleaned out as often as every forty-eight hours in order to break the cycle of coccidiosis. Now we have drugs which can be put into the mash to obviate this, and very often the litter has only to be changed between seasons. Such a saving shows up very noticeably on any costings which may be carried out in a big rearing organization.

There comes a time, however, when chicks will have to go out on grass if they are to be brought back into the laying houses in proper condition. So from six to eight weeks old until point of lay, free range arks or fold units will probably have to be used. Daily attention can be very expensive, although it is now possible to save a good deal of the cost of labour by having mash hoppers, made of laminated plywood and holding sufficient food for up to three days, attached to either ark or fold. Where a large number of units are in use, the cost of installing these hoppers will be more than repaid by the labour saved.

I think the lesson to be learnt from all this is that as we find it necessary to go in for a greater intensification for both rearing and laying birds, the skill displayed by the poultryman will have to be proportionately greater. I

would not want to see us go to the length that poultry-keepers have in America, where disease and mortality can be extremely serious. Nevertheless, there is a useful halfway mark which, by true British tradition, we usually adopt and carry out successfully!

MILK PRODUCTION IN SHEEP

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Recent work at Bangor has been directed towards measuring the milk production of ewes kept under differing conditions. From this it has been posible to examine the relationship between milk yield and factors such as the birth weight and growth rate of lambs, fleece and body weight of ewes, and udder size.

MILK recording has come right into the limelight in recent years, and we are continually being reminded of its vital contribution to livestock improvement. We seldom need to say milk recording of *cattle*, because the two are inextricably bound up in our minds. In consequence, we often tend to forget the importance of milk production in other kinds of livestock, such as sheep, where milk is only an intermediate product. Nevertheless, the production of milk is extremely important in sheep, since it provides nutriment for the lamb at the time when the capacity for growth is highest. In hill farming, where food is often short, the difference between a good and a poor milker means the difference between a well-grown vigorous lamb and a stunted one. With hill sheep, there are also other tactical reasons for the importance of milky sheep, in that well-grown lambs will be better able to face the hazards of the open mountains in early May. Where poorly grown lambs are turned on to the mountain, losses from foxes and other causes can be heavy.

Hill ewes are, of course, the main source of grassland breeding ewes, but milk production is also important in lowland breeds of sheep, especially where lambs are sold fat at an early age. The diet of these lambs is largely composed of milk which, in conjunction with good grass, maintains a very high level of growth. Cross-bred lambs are capable of quick growth, but this potential cannot be expressed unless the ewe has a high milk yield. Much of the effort expended in securing a first-rate crossing ram can be nullified if the ewes' milk capacity is deficient.

Good milking ability is also of importance in other respects. Any shepherd knows that a ewe lambing with a good supply of milk is liable to have a stronger maternal instinct. In addition, a plentiful supply of rich colostrum, with all its life-giving properties, is one of the major factors in the survival of the lamb in the first critical hours after birth. The hill farmer who aims at improving the milkiness of his ewes not only increases his returns from his own lambs but enhances the value of his draft ewes, for their main asset in the hard task of rearing, say, twin cross-lambs, is their milk-yielding capacity.

In view of the importance of milking ability in sheep, it is surprising that little scientific research has been done on the problem, except on those

breeds of sheep used for dairy purposes. The main reason for this is undoubtedly the difficulty of measuring milking capacity in sheep. Work on this problem was started at the University College of North Wales at Bangor in 1953, and some of the findings of the work done to date may interest sheep farmers.

Difficulty of Measuring Milk Yield The first problem to be tackled was that of measuring milk yield. Ordinary hand-milking cannot be used, since the sheep are not used to milking, and, because of incomplete let-down, the amount of milk obtained would not represent the amount available to the lamb. This difficulty can be overcome to some extent by allowing the lamb to suck one side of the udder whilst the other is milked by hand. This, in fact, was the way samples of ewe's milk were obtained for analysis. As far as the regular measurement of the milk yield of many sheep is concerned, however, the method is far too tedious and inaccurate to be of practical use.

Where work of this nature has hitherto been done, both in the study of lactation in sheep (for example, in South Africa [1], New Zealand [2], and this country [3, 4]) and in pigs, the usual method of determining the milk yield has been by separating the dam from its young. In the case of sheep, the lamb was then allowed to suck at various intervals during the day, and was weighed before and after each suckling. In this way, the weight of milk obtained by the lamb during that period could be ascertained. This method is very useful where sheep are being kept indoors under artificial conditions (and, incidentally, almost all the previous work done on this problem has been conducted under such conditions). Where, however, sheep are studied in their normal environment—that is, out in the field or on in-bye land—there is the great disadvantage that ewes separated from their lambs are generally much disturbed and their normal grazing behaviour is upset.

After some trial and error, a method was developed at Bangor which enabled a reliable estimate of the ewe's milk yield under natural conditions to be obtained. The ewe and her lamb were allowed to graze together during the recording period, the ewe being fitted with a light sacking udder cover. The cover was so made that, although it prevented the lamb reaching the ewe's teats, it could be manipulated easily at suckling time and, last but not least, it caused the least possible discomfort to the ewe.

This method worked well in practice and caused little interference with the normal activity of the sheep. Ewes were recorded for a full 24-hour period once every week, the lambs being allowed to suck four or five times during that period, according to their age and the milk yield of the ewe. The length of time between two sucklings should, in general, be short enough to prevent udder pressure and to enable the lamb to clear all the milk quickly and efficiently. Too short an interval, however, increases the number of times the sheep have to be interrupted in their normal grazing behaviour for gathering and handling.

Another requirement for an accurate measurement of milk yield is efficient organization to enable the handling of the sheep and lambs during suckling to be done quickly and with the least disturbance. A balance which will enable the lamb to be weighed to fractions of an ounce, is also necessary.

Environment Affects Yield Having briefly discussed the way the problem of milk recording in sheep was tackled, we can now glance over some of the most important findings of the present work. In 1953, 32 randomly selected ewes from the College flock of Welsh Mountain sheep were recorded for six weeks on the in-bye land, which is at 1,000 feet

above sea level. In addition, 8 ewes from a small flock of pedigree Welsh Mountain sheep bred and reared on the lowland for many generations were recorded for four weeks. In 1954, 40 randomly selected ewes from the hill flocks were recorded on the in-bye land for ten weeks, and another 21 ewes were recorded on the lowland for a similar period. Of the latter, 14 were hill ewes drafted to the lowland the previous autumn and tupped, some with a Welsh Mountain and some with a Suffolk ram; the remaining 7 ewes were from the lowland pedigree flock previously mentioned.

The yields obtained from these test ewes are shown in the following table. Samples of each ewe's milk yield were taken during lactation for chemical analysis.

Milk Yields from Test Ewes

Ewes Recorded	No.	Yield in lb. per 24-hour Recording Period — Period										Total Yield* (10 wk.)	Av. Wt. of Lambs at 10 wk.
		1	2	3	4	5	6	7	8	9	10		
												lb.	*lb.*
Lowland flock, 1953	8	2·6	3·1	3·3	2·7								
Hill ewes, 1953	32	2·1	2·3	2·1	2·1	1·8	1·7						
Hill ewes, 1954	40	2·1	2·2	1·9	1·7	1·4	1·3	1·3	1·3	1·4	1·2	109·3	36·2
Hill ewes on lowland, 1954 ...	14	2·8	2·8	2·7	2·6	2·5	2·4	2·3	2·2	1·9	1·8	171·6	53·4
Lowland flock, 1954	7	2·5	2·6	2·4	2·4	2·3	2·2	2·2	2·0	2·0	1·6	157·9	44·8

* Allowance has been made in the total for differences in the age of the lambs at each recording period, and for the fact that the interval between each recording period was not always seven days.

The table shows that there was a tendency for yields to be lower in 1954 than in 1953. This is probably due to poorer weather before and after lambing in 1954, and, in particular, to a severe drought which lasted nearly the whole of April and retarded the growth of grass.

The effect of environment on milk yield is clearly shown by the difference in the yield of the hill ewes lambing on the in-bye land and those drafted to the lowland in the previous autumn. The difference is almost 60 per cent of the hill ewes' yield! Fairly large variations occurred in the yield of individual ewes, both on the hill and on the lowland. The highest and lowest yields for the hill ewes were 141.9 lb. and 70.0 lb. respectively for ten weeks. On the lowland, the highest and lowest yields for the drafted hill ewes were 218.8 lb. and 108.5 lb. respectively for ten weeks.

Growth and Birth Weight Related to Milk Yield The results showed that in the early stages of lactation most of the variations in the growth rates of the lambs were due to variations in the ewe's milk yield, and between 4½ and 5 oz. of milk were required per ounce of growth. Lambs receiving little milk generally made better use of it than did lambs receiving plentiful milk supplies. For the first four or five weeks the lamb depends mainly on milk, and its growth rate tends to follow the same pattern as the ewe's milk yield—that is, a short initial increase until lactation reaches its peak, and then a gradual decline, depending on conditions. When the lamb begins to supplement its diet with grass, however, the growth rate starts to increase again. On the lowland,

there does not seem to be such a pronounced drop in the lamb's growth rate, because the ewe tends to maintain her peak yield for a longer time. Towards the end of the ten weeks the growth rate of the lamb begins to level out, or even to decrease. The relationship between the growth of the lamb and the milk yield of its dam is still very noticeable when the hill lambs come down from the mountain in the autumn.

Because of the close relation between milk yield and lamb growth in the early stages, the rate of growth of all the lambs in the flock from birth to earmarking time (when the lamb is approximately one month old), suitably corrected for age, were felt to be a good indication of a ewe's milk yield. This estimate, on account of the large numbers available, was found very useful in confirming the work done by direct estimation on a small sample of the flock. It could also be used to study aspects such as the inheritance of milk yield, which would otherwise be impossible because of the difficulty of direct estimation with large numbers.

In all the groups studied there was a fairly strong relation between the weight of the lamb at birth and the ewe's milk yield, the relationship being highest in the early stages of lactation. This phenomenon may be due to the direct effect of the lamb on its dam's milk yield, and to the fact that the ewe producing the heaviest lamb at birth under a specific set of conditions may be expected to give a heavier milk yield.

The data obtained showed that the latter effect was the most important, since the birth weight of the lamb was strongly related to the size of the ewe's udder at lambing time (discussed later).

The results also show that there is a relatively strong relation between the milk yield of hill ewes and their body weight, both at lambing and tupping time. This relationship was not apparent in ewes recorded on the lowland, although the number involved was too small to draw any conclusions. This effect of weight on milk yield is probably due to size rather than condition, since the relationship is strongest between weight at tupping time and milk yield, rather than weight at lambing time and milk yield. The condition of the ewes is likely to be more even at the former time than at the latter. This relationship between the size of the ewe and her milk yield again stresses the importance of adequate nutrition in the early life of the ewe. For this reason, adequate nutrition during the first winter is also important.

There is some tendency for ewes giving a high milk yield to lose more weight during lactation, although this has not been very marked in the observations made to date.

Some Other Observations No significant relationships have yet been discerned between milk yield and the weight of wool yielded by the ewe, or the various fleece characters. It thus seems that, in these sheep, milk production does not compete to any appreciable extent with wool growth. It also seems that, contrary to local opinion, there is no great difference in the milking capacity of sheep of different fleece types under hill conditions.

In 1954, the udders of all ewes lambing on the in-bye land and on the lowland (apart from the 18-month-old ewes) were measured when the lambs were born. The measurement, which was taken at the greatest width of the udder across the line of the teats, was found to bear a strong relation to milk yield in the early stages of lactation, and to the growth of the lamb from birth to earmarking time. It thus seems that ewes with sizable udders at lambing time are generally likely to yield well in early lactation. A good supply of milk at lambing is, in itself, of great importance in the early survival of the lamb, and the fact that it bears some relation to later milk yield is important.

since good milk yields are of less value if the lamb suffers in the first few days of life.

By making use of the indirect estimates of milk yield for the whole flock, it was shown that the milk yield of any ewe repeats well from season to season. In addition, from a study of the milking capacities of dams and daughters it seems that the milk-yielding capacity of hill sheep is quite strongly inherited, and it would appear that selection for milk yield would be relatively effective. This could be effected by selecting ram lambs whose dams are good milkers. In practice, it would mean basing the first selection on the weight of the lamb at about one month old. This could be done relatively easily with a hill flock by selecting the heaviest lambs of their age at earmarking time. So that each lamb could be selected within its age group, all lambs could be given a paint mark at birth. In this way, the culling of breeding stock on account of their dam's poor performance could be carried out.

Summary To sum up, it seems that milk production is very important in sheep, and any flockmaster would benefit by paying special attention to it. The effect of feeding on milk yield is undoubtedly of primary importance, as shown by the difference in the milk production of hill ewes in their native environment and in lowland conditions. Wise management of the ewe flock can often ensure that the best use of limited resources is made in order to give the ewe a good plane of nutrition in the later stages of pregnancy and during lactation. It is vital to ensure that the lamb is not retarded in its growth in early life.

Increased attention to milk yield should also be paid in selecting breeding stock, because it is more likely to increase sheep production than emphasizing too many characters which are often of no proved value. Increased milking capacity in sheep will not only help the lowland farmer; it will also greatly benefit the hill farmer by providing nutriment for his lambs at the time they can best use it, and by making his ewes more valuable for rearing cross-bred lambs on the lowland.

References

1. Factors Influencing the Growth and Development of Lambs, with Special Reference to Cross-breeding of Merino Sheep for Fat Lamb Production in South Africa. F. N. BONSMA. *Univ. of Pretoria Publ. Series 1. Agric. No. 48*, 1939.
2. Milk Secretion Studies with New Zealand Romney Ewes. C. R. BARNICOAT, A. G. LOGAN and A. I. GRANT. *J. agric, Sci.*, 1949, **39** (Part I), 44-55. **39** (Part II), 237-48.
3. Effect of Diet on Milk Yield of the Ewe and Growth of her Lamb. W. THOMSON and A. M. THOMSON. *Brit. J. Nut.* 1953, **7**, No. 3, 263.
4. The Growth of Lambs before and after Birth in Relation to the Level of Nutrition. L. R. WALLACE. *J. agric. Sci.*, 1948, **38** (Part II), 93-153, (Part III), 243-302, (Part IV), 367-401.

International Grassland Congress

The Seventh International Grassland Congress, which is being held in New Zealand from November 6 to 15, 1956, will bring together the world's leaders in grassland work and offer an excellent opportunity for the exchange of information and ideas.

The Congress is being sponsored by the New Zealand Government under the auspices of the New Zealand Grassland Association, which has set up an organizing committee to make all the arrangements. Full details can be obtained from the Organizing Secretary of the Congress, C.P.O. Box 1500, Wellington, C.1, New Zealand.

SUMMER AND WINTER FEEDING FROM GRASS-LUCERNE DRILLS

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Trials at the Grassland Research Station indicate that, so long as suitable rests are given in early spring and autumn, grass-lucerne drills will yield good, lasting leys capable of providing intensive grazings in both summer and winter. So far, cocksfoot-tall fescue-lucerne mixtures have been the most successful.

INVESTIGATIONS have been in progress at the Grassland Research Institute into the feeding of stock at grass during the winter with the minimum of supplementary feed, either as grain, hay or silage. The earlier experiments have been reported in this JOURNAL [1, 2], and a report of the later work has been published elsewhere [3]. For more general interest this article deals with the trend of developments up to the present time.

Previous articles have stressed the need for cheapening the costs of over-wintering beef stores intended for fattening on pastures in the spring and summer. The liveweight progress of a group of steers was followed from mid-January to late March or early April in the winters of 1947-48 and of 1948-49. The main feed available in each winter was the growth resulting from the late summer and autumn resting of S.143 cocksfoot grown in two-foot drills. This provided maintenance for cattle averaging two years of age. But it has been suggested that the winter utilization of grass drills must be considered along with summer utilization, the implication being that in order to justify the method of management of the area for winter grazing, maximum production should also be the aim during the growing season. To attain the latter in terms of animal and herbage output, it is essential that pasture balance of grass and legume be maintained, especially during the spring and summer. Allowing late summer and autumn growth to accumulate in the field in bulk, aided by the application of nitrogenous fertilizer, will in itself prove detrimental to the grass-legume pasture balance. Competition between these two important sward components managed in this way, when sown under normal broadcast conditions, results in the suppression of the legume and leads quickly to the formation of a pure grass stand.

It seemed essential, therefore, to devise some technique of pasture management that would overcome these difficulties, and to this end the legume used as a pasture component must fulfil three conditions. Firstly, it should have the ability to withstand a reasonable degree of winter treading; secondly, it should be able to tolerate repeated top dressings of nitrogenous fertilizer; and lastly, it must be protected from suppression by its companion grass when the latter is growing vigorously under the stimulation of nitrogenous fertilizer. The ability of lucerne to withstand grazing during the winter, when there is need to check the growth of the companion grass plant, is well known.

On this account, an investigation into the use of lucerne as the legume in association with grasses for winter pastures was considered desirable. Little was then known of the reaction of lucerne to the application of nitrogenous fertilizer, whereas, on the other hand, it was known that it did not take kindly to competition from its associate grass. This was overcome by adopting a technique of alternate drill sowing in which grass alternated with lucerne. The distance apart was one foot, and in the course of the experi-

ments this has proved satisfactory. The adoption of the drill method of sowing for the production of winter pasture has also proved beneficial in enabling the herbage to remain reasonably dry and acceptable to the animal during wet weather. This feature does not hold good for all grass species, but is apparent in the case of those that grow erect, as compared with species whose leaves tend to lie flat on ground level.

Five Mixtures Tried The first sowings of grass-lucerne drills were made in 1950, followed by further sowings in 1952 and 1953. The essential feature was to investigate various grass species and strains for the provision of winter feed, followed by their recovery during the growing season. The scope of these experiments, involving unknown features of cattle and sward management, had, of necessity, to be limited. Not all the grasses sown proved to be of equal value. As the work proceeded, however, some of the issues have been clarified, enabling suggestions to be made that should prove practical.

The seeds mixtures used in the sowings from 1950 to 1953 were:

		lb. per acre
A.	S.37 cocksfoot	3
	Lucerne	5
B.	S.50 and S.48 timothy	2
	S.53 meadow fescue	3
	Lucerne	5
C.	S.23 perennial ryegrass	3
	Lucerne	5
D.	S.170 tall fescue	5
	Lucerne	5
E.	S.143 cocksfoot	3
	Lucerne	5

In the main the mixtures were sown in 2-acre plots and were grazed or cut during the winter and summer as became necessary. One of the features of these mixtures is the low seeding rate of both the grasses and the lucerne. When compared with normal broadcast seedings, the seed rate has been reduced to one-third. Dry matter samples taken over a number of years show no reduction of yield per acre, as compared with broadcast stands.

Mixtures A, B and C were sown without a cover crop in the spring of 1950. Not taking into account the seeding year, these gave three periods of winter grazing in 1951-52, 1952-53 and 1953-54 respectively, together with summer utilization as grazing, hay or silage in 1951, 1952, 1953 and 1954. These three plots were ploughed out and sown to Hybrid 46 wheat in the autumn of 1954. Mixture D was sown in a similar manner in the spring of 1952 and was grazed during the latter part of its first winter 1952-53, followed by intensive winter utilization in 1953-54 and again in 1954-55. Here also, summer utilization followed in 1953 and 1954, and the stand is still in full production. Mixture E was sown in 1953; this, like Mixture D, was grazed during the latter part of its first winter, 1953-54, followed by summer utilization in 1954. At the present time (February 22, 1955) the stand is being winter-grazed.

Of the five mixtures so far examined for winter production, the advantage lies with cocksfoot and tall fescue. These grasses have the capacity to grow during the autumn and give sufficient bulk of feed to enable a reasonable stocking rate to be maintained during the winter. This growth stands off the ground, thus presenting a fairly dry and palatable feed to the animal at winter pasture. The quality of this herbage is not as satisfactory as could be wished, and winter burn tends to become excessive when using strains available commercially. Meadow fescue, timothy and perennial ryegrass are

rather better in this respect, but they do not give sufficient bulk in the autumn; also the accumulated leafage lies on the ground. In consequence, serious rotting takes place under wet conditions.

When the plots have been grazed, both in summer and winter, rationed grazing with the electric fence has been practised. In addition, the grazed portion has been protected by the use of a back fence. The adoption of this method of grazing during the winter, coupled with the long autumn rest, has resulted in spring recovery growth being normal. Following winter grazing, it has been possible to either cut or graze these areas twice during the growing season; in some cases three cuts or grazings have been possible. The contribution of lucerne to the established stands has been satisfactory in all mixtures, and even where treading has been severe and extending over three winters as in the case of Mixtures A, B and C, no deterioration of the lucerne stand has occurred. The lucerne makes no material contribution to the winter pasturing but the plant comes away again in the spring to give a balanced grass-legume stand.

Winter and Summer Utilization The winter pasturing of these plots has usually begun from mid-November to early December and has gone on until late February or mid-March. This is followed by a period of early grazing on Italian ryegrass, after which it has been possible to return to the winter-grazed areas for spring and summer pasture. Summer utilization goes on until late July or mid-August, when the grass-lucerne drills are rested to make maximum autumn growth. During this period Italian ryegrass is again used for autumn grazing. In general terms, even when using several unsuitable seeds mixtures, winter stocking has been of the order of one 18-21 months-old steer per acre, followed by double this rate of stocking in spring and summer. With the experience now available as to suitability of species and strains of grasses to be used for these particular purposes, it appears probable that a stocking rate of 1½, 18-21 months-old cattle per acre from December to late March is within reach.

Cattle have been overwintered in this manner without supplementary feed, but tend to lose weight in midwinter. This loss in weight can be avoided by the feeding of 3-4 lb. per head of grain as a supplement to the winter pasture. The cattle, although not gaining weight in winter, suffer no setback on being turned out to spring pasture. Similar cattle housed inside and giving better liveweight gains in the winter lose this advantage, due to the check they receive when turned out to grass. The overall gain in weight during the winter and summer is, therefore, similar in both groups, the advantage lying in the relative cost of wintering in terms of food and labour. In the cattle handled so far, no apparent loss of carcass quality results from overwintering outdoors on grass.

References

1. The Utilization of Foggage. G. Pearson Hughes. *Agriculture*, 1948, **55**, 98-101.
2. The Outwintering of Beef Stores on Grassland. G. Pearson Hughes. *ibid.*, 1949, **56**, 200-3.
3. The Production and Utilization of Winter Grass. G. Pearson Hughes. *J. agric. Sci.*, 1954, **45**, 179-201.

Correction

April 1955 issue. The name of the chrysanthemum described as "Royal Crimson" in the illustrations on p. iii of the art inset, should be "Holiday".

SELF-FED SILAGE

THE EFFECT ON MANAGEMENT AND POLICY

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The reorganization of Hipe Farm on the basis of forage farming has cut costs in labour and food while keeping up the average milk yields.

TWO winters ago I recorded in this JOURNAL* the first self-feeding silage trial on a small North Bucks farm of 110 cropping acres. The trial was successful; at least, it can be so assumed, since the occupiers, Messrs. Houghton Bros., have not fed silage in any other way since, and are firmly of the opinion that they will never again resort to hand-feeding by cutting and carting.

It is therefore interesting to follow up the system on this farm and look at the results now that they have finished their third winter. The claim that the actual technique of self-feeding is simplicity itself has been clearly proved here. The statements made in the first and other articles largely hold good: 6 feet 6 inches to 7 feet of finished silage; about 9 inches of feeding face per cow, with 24 hours per day access, depending on the density and length of material ensiled; uniform fermentation; 1-1¼ cwt. silage per cow per day, depending on supplementary feeding; and, of course (equally applicable to all silage), good quality material. Correct adjustment of the feeding face is important, so that freshly exposed silage is eaten. We have found that less dense material on too wide a face causes selective grazing, and this is further aggravated by secondary fermentation and therefore reduced palatability in the staler silage areas of the face.

What is of far greater importance than the actual self-feeding technique is the effect of an all-self-feeding policy on management. The growing of the crops, the organization of silage-making, the machinery and labour necessary, are all points requiring consideration. Are the advantages of the system sufficiently attractive to make considerable reorganization worth while? In the case of Hipe Farm, it was thought so.

Change-over to Forage Farming By self-feeding, silage is consumed at the rate of approximately 1 cwt. per head per day. This in itself creates the first big problem—the making of a bigger tonnage. Secondly, the production of milk has to be increased from the silage itself, and this means drastic changes in the feeding programme. The final result at Hipe Farm has been a change-over, in the last twelve months, to forage farming—meaning the complete exclusion, apart from exceptions which will be mentioned, of all concentrates, whether home-grown or purchased.

Self-feeding of silage fits in admirably into a forage farming system, and the programme on the farm is something like:

Early Spring	...	H.1 ryegrass
Summer ...	...	3-4-year leys
Early Autumn	...	Kale grazing
Five Winter Months	...	Self-feed silage

In other words, we are trying to replace normal day-and-night summer

* Self-feeding of Silage. November 1953, pp. 358-62.

grazing of grass with the grazing of a high quality forage, such as kale and silage, in the autumn and winter periods.

Every effort was made to increase the tonnage of silage for the 1953-54 winter. With hard physical work and long hours by an increased labour force, a large stack certainly resulted. The period of feeding was extended but still fell far short of the five months required. Another problem was immediately evident: with self-feeding, apart from milking the cows, very little labour is required during winter, but at the same time the labour force necessary to make the bigger tonnage of silage in summer was substantially higher. One aspect of good management is a level seasonal labour requirement, and it was decided to examine carefully the organization of making to see if it could be handled by the low winter labour force resulting from self-feeding. It was felt that provided the physical effort of silage-making could be reduced, two men could satisfactorily handle all the work on the 110-acre farm. As on many other farms, this reorganization had to be achieved with strictly limited capital.

More Silage with Less Labour Under the old silage-making system the grass was cut with a mid-mounted mower on a tractor, which at the same time towed a four-wheeled trailer and green crop loader taking up the previous swath. The full field team, two loaders and the tractor driver (a fourth man who milked and did the yard work was available half-time), returned to the buildings where the material was unloaded by hand into the elevator. Apart from its slowness, loading and unloading called for a lot of hard work. Each operation in the system was carefully analysed, and from this it was obvious that the bottlenecks were in the speed at which the trailer could be loaded in the field and then unloaded at the buildings. If less labour was to be used on the complete silage-making operation, a great deal of the physical work would also have to be taken out of these two operations, and they would have to be done in much less time. It was decided to reorganize on the following lines:

1. Cutting was made a separate operation and the mounted mower replaced by a trailer model.

2. The green crop loader was retained and a substantial saving in field time achieved by the incorporation of an automatic hitch-and-release mechanism, which enabled the green crop loader to be connected up with the trailer and released without the driver leaving his tractor seat. This cleverly designed invention by one of the brothers made a big contribution to the increased output of the new system and greatly simplified the rest of the reorganization.

3. The four-wheeled trailer was dispensed with, and a small, high-sided, two-wheeled trailer measuring 7 feet wide by 8 feet long was substituted. This is self-loading and, with the automatic hitch, reduced the team in the field from three men to the tractor driver only. Speed of loading is no longer dependent on the rate at which men on the trailer could cope with material from the loader, and the rate of travel has been speeded up to between four and five miles an hour. The load has been reduced to about 20 cwt., but the speed of the round trip more than compensated for this, eight minutes only being required in the field to load the trailer from a good swath.

4. Mechanical unloading was essential if the work had to be made easier and speedier. A self-feeding pit was designed which the tractor and trailer could draw over without bogging down. Drainage is important here, as the slope of the floor of the pit must always be away from the feeding face. By a system of ropes under the load, unloading was accomplished in one

minute, and the now comparatively small loads were easy to spread. The other man at the pit had sufficient time to do the milking and yard work as well.

Final results of this organization in the 1954 silage season were that one man could collect and cart to the pit on average 4 tons of green material per hour, and this could be spread by the second man in half his time—in other words, 1½ men instead of the 3-3½ required by the previous system. Output per man went up approximately six times, and with much less effort. One aspect should be noted in particular—the reorganization was carried out very largely with existing fixed equipment and a minimum of capital expenditure. Green crop loaders, of which there are quite a number on farms today, could previously be regarded as man-killers as far as silage-making was concerned. With the automatic hitch and self-loading of a smaller trailer, they can again take their place as very useful pieces of silage-making machinery.

The herd is at present around the 30-cow mark; the objective is a herd of 40 cows with no followers, and about 30 acres of cereals per year. With the reorganized silage system, it is felt that the high silage requirement of 7½ tons per cow for a five months winter period can be achieved by two men. This means some 300 tons of silage a year.

Three hundred tons of silage may appear to be high from the grassland available, but it is being achieved on many farms of similar size. Hipe Farm is strong, heavy land, and three- to four-year leys have given some extremely high cuts of green material. This was very evident in 1954 and resulted in an extremely low cost per ton of silage. Fertilizing requirements are high—in the region of £5 per acre.

So much for the production of the silage. What of the economics of the system—has it a future? I am firmly convinced that it has. Firstly, because it is cheap, both as regards food and labour. The cost of starch equivalent in grazing grass, kale and silage is nearly four times cheaper than starch equivalent purchased in dairy cake at £35 a ton. In fact, with the extremely heavy silage cuts obtained on the farm last year, the winter food costs per gallon dropped to the remarkably low figure of 11½*d*. in December, January and February of this last winter.

March 31, 1955 was the end of a period of twelve months during which, as previously stated, no concentrates had been fed and no attempt had been made to ration the cattle, apart from a short experimental period. The herd was supplied with as much high quality forage as could be produced all the year round, allowing free access at all times. It is extremely interesting to study how the individual animals of the herd reacted to this system of management over the twelve months. Unfortunately, trouble has been experienced with hypomagnesæmia, which rather masks the results. It is doubtful if it can be related directly to the system, as hypomagnesæmia occurs with varying intensity on all types of farms where more traditional feeding methods are practised. It is often associated with turning out to lush, quickly growing grass, but it can occur under stall-feeding conditions. Cases of hypomagnesæmia seem to have been more prevalent this spring than normal. Several of the cows lost condition, and about 44 cwt. of starchy food in the form of molasses, barley, oats and flake maize were fed to cows which had been affected. Methods of prevention which will fit into the system of management of the farm will be tried out.

900 Gallons without Concentrates In examining the milk records on pp. 121-2, it should be noted that the yields are for a full twelve months, and relate to all animals in the milking herd.

SELF-FED SILAGE

Stock on Hipe Farm

Dairy cows	24	For 12-month period
Down-calving heifers	3	
Cow (culled)	1	For 6-months summer period only (i.e., fed on grass—no winter feeding)
Cow (died)	1	
Aged cows (sold)	2	

List of Cows and Milk Yields

Name of Cow	*Milk Yield (12 months) lb.*	*Notes*
1. Mirabelle	5,896	Jersey heifer calving 1st calf in February 1954. Peak yield = 33 lb. Dry 9 weeks.
2. Nip	5,334	Friesian heifer calving first time in August 1954 and still giving 20 lb. per day. In-calf again.
3. Firefly	5,901	Third calf cross-bred Jersey. Dry 9 weeks during past year. Now giving 1 gallon per day.
4. Madge	8,549	Shorthorn (home-bred). Now dry (12 weeks). In-calf. Highest daily yield = 43 lb.
5. Welcome	9,824	Just calved 11th calf after being dry 11 weeks. Highest daily yield = 62 lb.
6. Pride	10,934	Shorthorn (home-bred). About to calve with sixth calf after being dry 12 weeks. Highest daily yield = 74 lb.
7. Magnolia	10,049	17-year-old cow which has had 13 calves. Has been dry 9 weeks to date—uncertain whether she is in-calf. Highest daily yield = 60 lb.
8. Linn	9,324	Cross-bred Jersey now in-calf with 4th calf. Highest daily yield = 49 lb.
9. Clover	9,168	Shorthorn (aged). Dry during past 13 weeks, but soon due to calve. Highest daily yield = 54 lb.
10. Fairy Duchess ...	10,031	Shorthorn (aged). Died suddenly (hypomagnesæmia) on February 23, 1955. Calved February 1954 and had been dry 4 weeks at time of death. Highest daily yield = 52 lb.
11. Bess	5,411	Shorthorn. Calved October 1954, now in-calf. Dry period during the year 8 weeks. Highest daily yield = 46 lb.
12. Betty	6,722	Cross-bred Jersey. Calved October 1954 and now in-calf.
13. Greta	7,527	Cross-bred Jersey. Calved September 1954 and now in-calf. Dry period between lactations 7 weeks.
14. Fairy Duchess 2nd	6,272	Shorthorn. Calved December 1954 after being dry 22 weeks. Now in-calf.
15. Nellie	3,590	Jersey cross. Calved June 1954 but in-milk only 24 weeks. In-calf. To be culled.
16. Bunty	8,200	Shorthorn. Calved January 1955 after being dry 12 weeks. In-calf again. Hypomagnesæmia soon after calving, when much condition lost.
17. Honeysuckle ...	4,351	Shorthorn. Low yield attributed to hypomagnesæmia—very slow recovery and much condition lost.
18. Sally	4,389	Cross-bred Jersey. Calved December 1954 after being dry 24 weeks. Now in-calf again. To be culled.
19. Matilda	7,766	Shorthorn. Calved November 1954 after being dry six weeks. In-calf again. Hypomagnesæmia while grazing kale, when much condition lost.
20. Strawberry ...	9,541	Shorthorn. Calved November 1954 after being dry 7 weeks.
21. Peg	9,990	Friesian. Calved January 1955 after being dry 6 weeks. Not in-calf. Bad attack of hypomagnesæmia on March 22.
22. Hyacinth	5,194	Cross-bred Jersey. Calved December 1954 after being dry 10 weeks. In-calf.
23. Bluebell	8,456	Cross-bred Jersey. Calved February 1954 and due to calve April 1955. Already been dry 12 weeks.
24. Daisy	5,592	Ayrshire. Calved January 1955 after being dry 14 weeks. Not in-calf.

SELF-FED SILAGE

Milk Yields, 1954-55

Total milk recorded for 24 cows in the period April 1, 1954 to March 31, 1955	= 178,011 lb.
	= 17,801 gallons
Average yield per cow (making allowance for 4 part-time cows)	= 685 gallons

A total of 32 cwt. dairy cake was fed for a trial period of approximately one month to the fresh calvers, which were at the time on *ad lib.* self-feeding of silage, to observe if any better results would be forthcoming. The consumption of silage dropped from the daily average of approximately 130 lb. for the herd as a whole in these individual cases, but under this system of dairy farming the value of the increased milk obtained was only just sufficient to meet the cost of the cake. Attention to individual cows is more difficult where a herd is being managed on a self-feed system. The unit is the herd rather than the individual cow.

It will be noted that several of the cows calved down with reasonably good daily yields. Lactation curves for winter-calving animals on self-feeding of silage are steeper than those normally obtained by traditional feeding methods, but cows calving about January seem to level out at round about 4-4½ gallons. The point of extreme interest, however, is the wide variation in yields between the individuals where all cows in a herd have access to forage *ad lib.* and all the year round. It is obvious that given exactly similar environmental conditions, some of the cows are very much more efficient converters of forage than others. Although yield per cow under forage farming conditions is of secondary importance to food cost and labour input, the figures show that these individual yields need not be low. Eight cows out of twenty-four in the herd for the full twelve months period gave over 900 gallons without any concentrate feeding. There is great scope here for a selective breeding programme to build up a herd of first-class forage converters.

The twelve months programme was as follows:

Grazing started on April 1, 1954, on outwintered grass and continued on leys from mid-April to mid-May; then alternately on leys and permanent grass until mid-September. No concentrates of any kind were fed during this period. Kale grazing started in mid-September and continued until December 10, when it was stopped as far as the milking herd was concerned because of the extremely wet conditions. From this date dry cows and in-calf heifers wintered out on the kale which was still left. The self-feeding of silage started on December 10 and continued until the end of March 1955, the herd being maintained and 30 gallons of milk produced from every ton of silage consumed. Total concentrates for the twelve months, apart from the 3½ cwt. dairy cake mentioned, amounted to 18 cwt. molasses, 22 cwt. barley, 2 cwt. oats and 2 cwt. flaked maize. The barley, oats and maize were fed entirely to the cows which had suffered from hypomagnesæmia, in an attempt to keep up their condition. No hay or straw was fed and the covered yard was bedded down with badly weathered wheat straw.

Where no trough feeding is practised, it is difficult to get minerals into the cows, and this is obviously essential on this farm. It is proposed in future to feed magnesium minerals with 2-3 lb. per day of cereals. It is felt that this will also improve the feeding since, with high quality forage, protein is likely to be in excess.

Acknowledgement and thanks are made to Messrs. Houghton Bros. for their co-operation. It takes courage to try out a system involving such a complete departure from accepted practice.

HORTICULTURE IN THE TAMAR VALLEY

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Founded on fruit-growing, horticulture in the steep-sided Tamar Valley today produces fruit and flowers of several kinds, to an estimated total annual value of about £250,000.

AFTER passing through the outskirts of Launceston, the River Tamar becomes the boundary between Devon and Cornwall, and winds tortuously through some of the most attractive country in this delightful area until it reaches the sea at Devonport. But, for horticultural purposes, it is the stretch on both sides of the river between Horsebridge, some eight miles south-east of Launceston, and Saltash, nearly opposite the intersection with the River Tavy, which is generally regarded as the Tamar Valley. A concentrated and highly specialized horticultural industry, centred on the production of early fruit and flowers on small family holdings, and characterized by the very steep slopes which are cultivated, has been built up in the valley. Today, the number of growers taking part in this production approaches a thousand, and includes those growing solely horticultural crops, a few farmers growing some horticultural crops, and a fairly large number of "part-timers". About three-quarters of these growers live in Cornwall, the remainder being in the parishes of Bere Ferrers and Tamerton Foliot in Devon. The purely horticultural holdings are usually between three and ten acres, but many are smaller, and a few are even less than one acre.

Virtually nothing of the horticultural industry can be seen from the main roads; more is visible from the river, but most of the holdings are on south-facing slopes in the tributary valleys, where unusually favourable conditions exist. Winter temperatures are warm, though not quite so warm as west Cornwall, and, except in occasional seasons, frost does not occur between mid-April and the end of October. The wide expanse of water in the river and good air drainage to it keep down the number of frosts. The Tamar Valley suffers much less than west Cornwall from wind, both because of the lie of the land and also through the abundant tree shelter. Rainfall is rather heavy, averaging over 45 inches a year, but it is commonly dry in April, May and June, when the monthly average is 2-2½ inches. This climate can sometimes be uncomfortably dry for the strawberry-grower. Spring sunshine is particularly good, averaging about 4½ hours a day in March and nearly 6 hours a day in April. Consequently, the steep, south-facing slopes warm up extremely quickly. And steep they really are! One, measured by Goodchild [1], was found to have a slope of 34 degrees—a gradient of between 1 in 2 and 1 in 1.

Excessive erosion might be expected on such land in a district of high rainfall, but both soil and subsoil have remarkable water-retaining properties, and although the soil often seems saturated, yet it generally remains in position. Nevertheless, growers do have to deal with soil that washes down and builds up against the Cornish "hedge"—a bank which usually forms the lower boundary of the "garden". Originally, this soil was raised by shovelling it into a handcart attached to a wire rope and hauling the load up the slope with the help of a horse working a pulley system at the top. More recently, however, growers have made use of old motor cars for motive power, with a scoop to carry the soil. The same systems are, or have been, used to draw a plough uphill, or to stay the weight of the manure cart.

Many two-wheeled rotary cultivators are in use in the valley today, and these can be worked satisfactorily uphill. Apart from these machines, hand cultivation predominates, and several tools seldom seen elsewhere are used. Besides the Cornish shovel and turning fork, there are the sclum (similar to a manure drag) and the Tamar Valley dibber. This last has a narrow blade set at rather more than a right-angle to the short handle; it is widely used and is particularly suitable for making a vertical hole on steeply sloping ground.

A Manuring Problem The soil is derived from Devonian shales, often much contorted by the nearby metamorphic intrusions. Most horticultural soils consist of light loams, often very thin, but passing into a very "shillety", fissured subsoil which allows plant roots to penetrate readily to reach cool, moist conditions. Naturally acid, Tamar Valley soils require liming for the majority of crops. Formerly, limestone was brought up the river in sailing barges and was burnt in kilns, ruins of which can be seen near all the quays. The method of burning has been well described by Grigson ([2]). Today, however, ground limestone, produced in Plymouth, is mainly used.

The fertility of the soil, and of the strawberry ground in particular, was built up in the past by the use of town manure or "dock dung". This accumulated at the old town refuse dump at Pottery Quay and could be had for the cost of its transport up river in boats which carried eight or nine horse loads (40-50 tons). It consisted of all manner of manure—night soil, fish waste and offals—and was highly odoriferous; its use was finally stopped by the sanitary authorities in 1913. Insanitary as it may have been, it did grow strawberries, and the thick layer applied (30-40 tons per acre annually) was undoubtedly one reason for the high yields and long life of the strawberry beds, which, at that time, were far above the average for the country. Seaweed was also used extensively for some crops in the past, being brought up in small boats from around the mouth of the river below Saltash, where it was cut from the rocks, pulled, or collected from the beaches ([2]).

The disappearance of dock dung presented a tremendous problem to the horticulturist, especially since most farm leases in the area have a retaining clause preventing the sale of farmyard manure. "Point stuff" (leaf mould dredged from the river) was one humus-producing material tried, and shoddy was popular when easily obtainable in the 1930s, but nowadays castor seed meal and cocoa waste are most widely used. The problem certainly needs attention; many growers are introducing pigs or poultry as a fertility-producing enterprise, and short-term leys may also offer a possible solution.

Nineteenth Century Development Until the middle of the nineteenth century the Tamar Valley was made up of pleasant farmland, on which orchards and numerous oak woods were a feature. Much of it was included in the estates of Mount Edgcumbe (which included Cotehele, now National Trust land), Pentillie and Moditonham. Far-reaching changes, however, resulted from a trip to London made in 1862 by Mr. J. W. Lawry, tenant of a farm at Bohetherick, St. Dominic. When visiting Covent Garden market, he noticed the high prices being paid for strawberries which were no better than those he had at home ([4]). He determined to try his hand, and within twenty years a thriving strawberry-growing industry was built up that altered the whole pattern of life in the Tamar Valley. Men of the village began to seek pieces of woodland (warm, steep slopes covered with oak coppice were favoured) and set to work to make "gardens". To this day, these Tamar Valley holdings are still called "gardens". In 1883, Mr. William Rickard of St. Dominic took some woodland at Denham on the banks of the Tavy and, with Mr. H. W. Sherrell of

South Hoo, became the pioneer of strawberry-growing in Bere Alston. Production developed along similar lines to that in Cornwall with, perhaps, rather more bias towards horticultural production on the larger farms.

While St. Dominic growers had their eye mainly on distant markets for their fruit, lower down the river, at Cargreen and Saltash, the proximity of Plymouth directed interest particularly towards all-the-year-round supplies of a greater range of crops. Fruit-growing was again the major enterprise, and development was particularly marked between 1900 and 1908. Saltash grew fruit and other products almost exclusively for Plymouth, or for the several tea gardens where Plymothians came to enjoy strawberry and cream teas. Such "teas" were also provided by Calstock housewives to trippers from the pleasure-steamers (4). This, however, represented only a fraction of the produce of Calstock where, besides full-time growers, many men engaged in the mining industry also cultivated gardens. With the failure of the mines and ship-building, horticulture became for many their sole occupation. In fact, throughout the valley it has always been the way of young men to cultivate small pieces of land in their spare time and, if fortune favoured them, eventually to make it a full-time job.

Industry Founded on Top Fruit Though now of diminishing importance, Tamar Valley cherries are unique in England and, apart from the age-old farm cider apple, are the oldest fruit crop in the area. The abundance of cherry orchards in the parishes of Calstock and Stoke Climsland was commented upon in 1814 (5) and again in 1867 (6), but the real development of selected varieties took place in St. Dominic and Botus Fleming. These Tamar Valley cherries are black, very well flavoured, but rather small. In contrast to Kent varieties, they are not prone to split in wet weather and are rarely attacked by birds. Many of the varieties selected and developed were named after the raiser or the farm where they were found—as, for example, the well-known Burcombe, Birchenhayes, and Fice. Wild Cherry was used as the rootstock and grafted either in the woods or in a nursery bed.

The trees were planted out, sometimes in lines to provide shelter for ground crops, but often in orchards (especially at Botus Fleming). Most of the cherries are now past their prime, but huge trees still exist and yield 2-5 cwt., and occasionally 7-10 cwt., of fruit per tree. Picking normally starts in the latter part of July after the strawberry crop is finished, and the fruit is sold locally. Since the war demand has slackened and very few cherries have been planted in recent years.

The very old apple orchards consisted mainly of cider fruit, with some culinary and "resting" (winter dessert) apples. At the turn of the century many better varieties of apples and plums were planted in the Tamar Valley, but growers unfortunately thought that trees on Paradise stock could be put 12 feet by 12 feet with gooseberries between. Many overcrowded orchards resulted, and the position was not eased by a clause commonly inserted in the lease requiring that a certain number of trees be maintained in the garden. Varieties that are relatively scab-resistant, such as Jubilee and Duke of Devonshire (particularly well-grown at Botus Fleming), proved most successful. Modern production methods for apples are impossible in the Tamar Valley, and today apples are virtually redundant, except where they are used for shelter.

Victoria plums were planted widely between 1900 and 1910, but twenty years later Silver Leaf disease had almost completely wiped them out. Growers fell back on more resistant varieties, but demand is now so small that they, too, are likely to disappear.

Strawberry Fame More than any other crop, strawberries brought fame and prosperity to the Tamar Valley. There seems some doubt as to the identity of the variety first grown in the valley, but soon after Brent's Wood was broken up, plants of Princess Alice Maud were brought from Pentillie Gardens and tried there. Within a few years it was the sole variety grown. Eventually Royal Sovereign was introduced into the district by Mr. William Rickard of Denham, and, with Paxton for late picking, it reigned supreme for many years. Tremendous crops were obtained (St. Dominic alone is estimated to have produced 200-300 tons of strawberries a year) and beds often remained productive for ten or even twenty years.

Picking, which usually began at the end of May, was done mostly by women, who started work at 5 a.m. and earned up to 3*s*. a day. The fruit was, for a number of years, picked into round punnets made locally during the winter months. The price paid to the pickers was 10*d*. per gross, and to make a gross was a good day's work. The container to take the punnets was, before long, standardized to the strawberry box holding 54 punnets. Bracken was cut for picking material, and it was the job of small boys to break it into separate fronds, which they laid out in neat rows. These fronds were placed between the layers of punnets and on top, with the stalks to the side. The scent of the loaded strawberry wagons is still remembered by some of the local people, and, indeed, the method was well-nigh perfect from a marketing point of view, with the soft fern to keep the fruit cool and safe from jolting.

Later, the square, factory-made punnet came into use, and eventually growers took to chip baskets holding 4, 3, and, lastly, 2 lb. of fruit. Although the chip is easy to fill, the fruit receives no cushioning or insulation, and the baskets have to be handled individually. This year, however, British Railways are introducing a wire-mesh container to hold three dozen 2 lb. chips. Growers are also appreciating the benefits of using small punnets packed in lath wood containers. These greatly improve the presentation of the fruit, and it is estimated that in 1954 one-third of the strawberry crop was marketed in this fashion. The annual dispatch of fruit (now mainly strawberries) by rail amounts to 250-350 tons, valued at £40,000-£50,000.

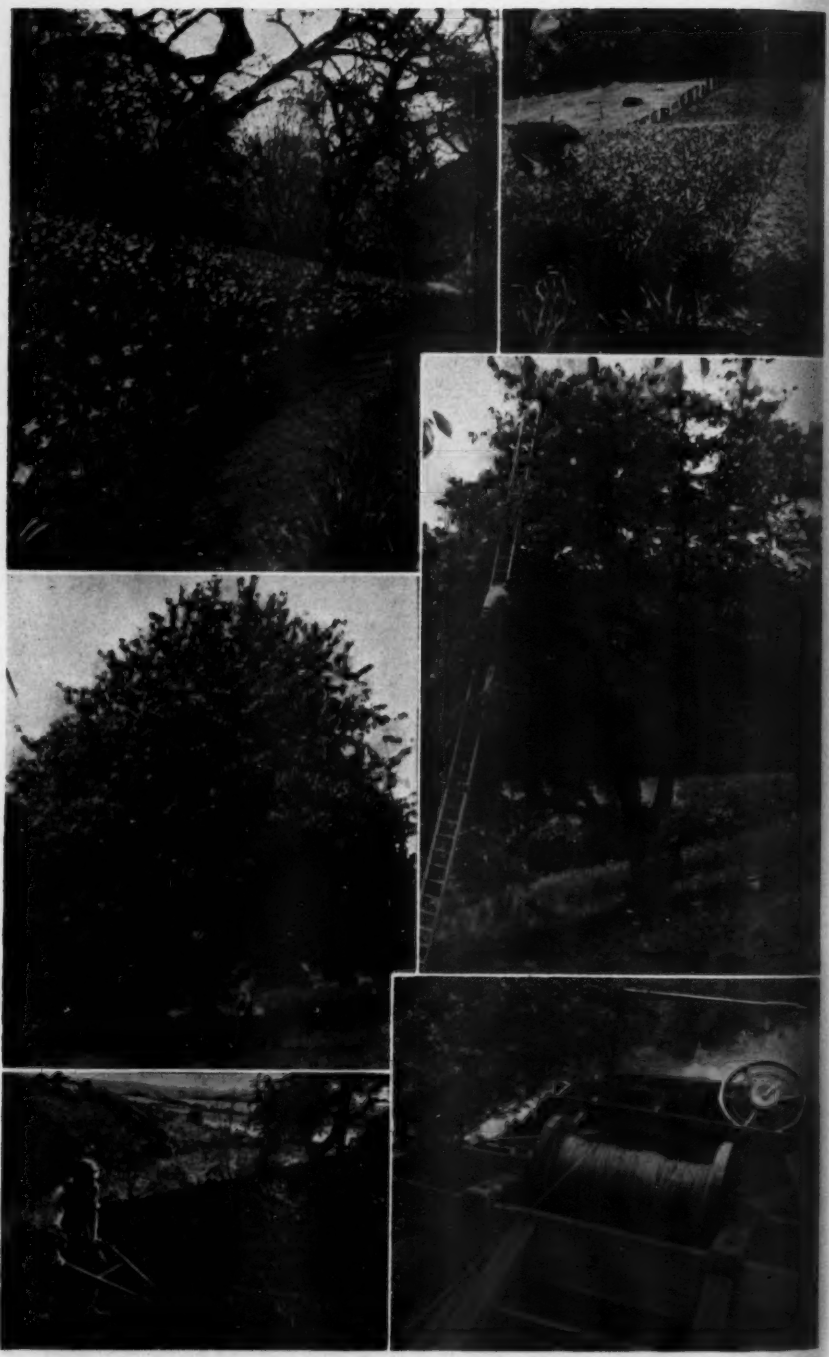
In the past, late strawberries were "plucked" into tubs for jam and were sent to jam factories. But prices were never very satisfactory—usually £10-£12 per ton, and sometimes falling as low as £7; this practice has now been discontinued.

Before the First World War there were already some signs of trouble in the strawberry beds, on which the crop had been grown continuously for thirty or forty years. Real trouble started in the 1920s, as a result of what is now known to have been virus and eelworm infection. In consequence, Royal Sovereign disappeared, and since then no virus-sensitive variety has proved successful. Madame Lefebvre became the accepted variety, with smaller quantities of Huxley for late picking. Further difficulty came to a head in 1947-48, when Red Core disease was found to be widespread. Today, most Red Core land is used for other crops, and the varieties grown are Madame Lefebvre (on clean land), Early Cambridge, and the more recently introduced Prizewinner. A new early variety of vigour and quality is a most urgent need.

Some Other Popular Crops Until recently, considerable quantities of gooseberries were grown. The crop took the form of either very early berries, picked pea-size for dispatch to distant markets, or dessert fruit for Plymouth. Keepsake was the favourite early variety and picking was expected to start at least by May 12 (St. Dominic

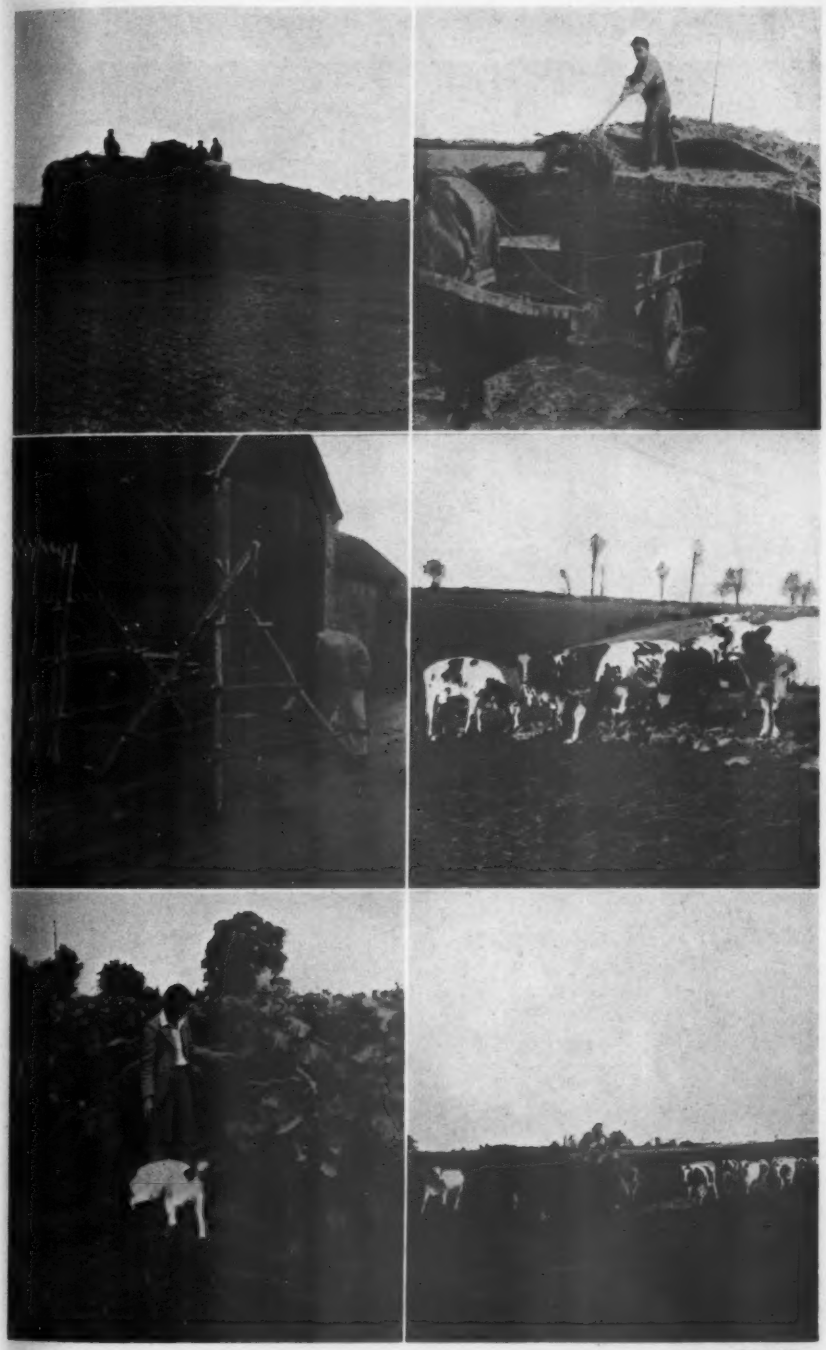
Photo: *Western Morning News*

The Tamar Valley, scene of a concentrated and highly specialized horticultural industry. The opening in 1908 of the Calstock Viaduct (seen above) enabled growers to load their produce direct on to the railway.



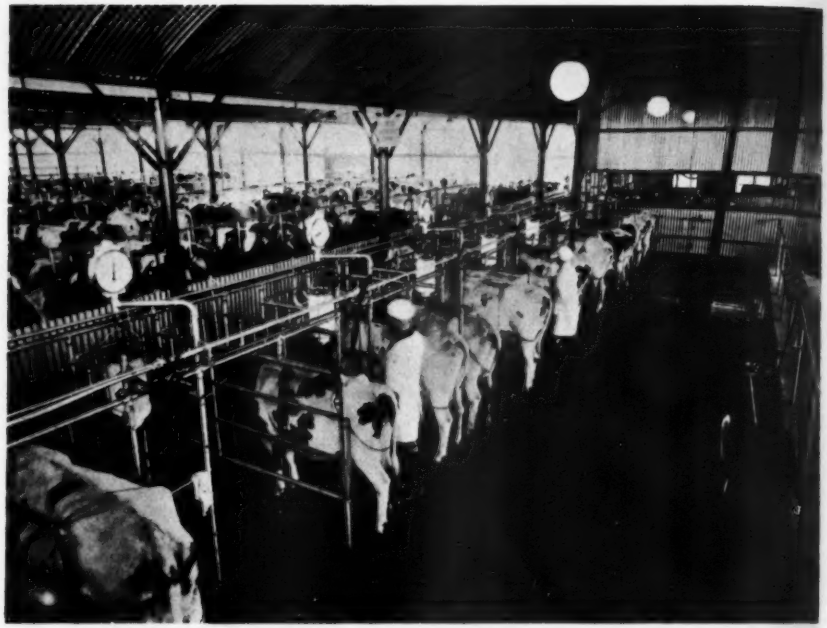
Photos: *K. H. Johnstone and D. J. Goodchild*

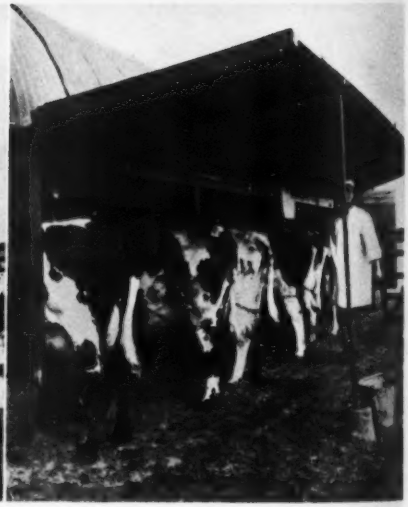
Tamar Valley. Narcissi and cherries. On the steep-sided slopes, horsepower helps manpower.



Photos: *Clyde Higgs*

Milk at Lower Cost. Four points in the feeding programme—quality silage, good hay, roots and kale.





Photos: *Clyde Higgs*

Milk at Lower Cost

A four-bay Dutch barn-type building, holding 144 cows. Outdoor milking bails are ideal for cheap summer milk.

Feast day). One Cargreen grower recollects eating gooseberry pie on April 14. Early fruit was packed in gooseberry hampers holding 6-8 quarts, and was covered with rushes and secured with hazel spears. For dessert, Early Jinny (a small but very sweet yellow variety) and Red Rough were popular. Later, Whinham's Industry and Careless were introduced.

Caterpillar (sawfly) was the only trouble experienced by gooseberry-growers up to about 1910. It was successfully controlled with hellebore, or, if this was not available, an extract of boiled foxglove leaves. The appearance of American Gooseberry Mildew was, however, a major blow. Despite the strenuous efforts of the Board of Agriculture to control the disease, mildew has dogged the steps of the Tamar Valley gooseberry-grower ever since, although the main reason for the reduced acreage today is the lack of consumer interest.

Although not suitable for long distance transport, raspberries used to be cultivated widely for local sale and for jam. These were grown in larger areas than strawberries, such as fields up to 4-5 acres in size. Thimble was, perhaps, the first variety grown, but soon Beehive became as widespread as Princess Alice Maud was among strawberries. Yields of 1 ton per day over a fortnight's picking in a 4-acre field are recorded for this variety. Output from St. Dominic alone in 1906 was estimated at 100-150 tons. After Beehive came Superlative and Perfection, and later, Lloyd George which, though excellent in its prime, degenerated through virus disease. Of the newer varieties, Malling Promise seems to be too susceptible to *Botrytis* for the Tamar Valley, but trials at Bere Ferrers suggest that Malling V is very promising.

Rhubarb was formerly popular in Plymouth and other local markets, and a good deal was grown at Cargreen, St. Dominic, and Calstock. The old pink-fleshed Raspberry Rhubarb and scarlet Cargreen strain were originally favoured. Pulling began in March or even February, growers particularly aiming at getting a good pull for the Easter market, when the demand was especially good.

The Tamar Valley has never produced large quantities of vegetables, since these could equally well be grown on more easily-worked land. However, growers supplying Plymouth usually raise limited quantities, including peas, autumn-sown broad beans (which succeed particularly well under partial shelter of fruit trees), runner beans, winter lettuce and cabbage. During the last war many more vegetables were grown. Winter lettuce was greatly increased, and outdoor tomatoes, sweet corn and many other kinds of vegetables were temporarily profitable.

Although the majority of holdings are out of doors, a few growers now find a small glasshouse a useful adjunct. The main concentrations are at Calstock and Saltash, which have long been interested in glasshouse work. The general practice is to grow tomatoes with the minimum of heat for Plymouth and other local markets, and to follow with chrysanthemums. This fits in well with the peak harvesting of outdoor bulb flowers and strawberries.

Flower Crop worth £150,000 Although flowers are now the most important of Tamar Valley crops, they did not figure largely in the early days of the industry. Various narcissi, however, grew wild or as denizens of the hedges and orchards, and Mr. Jackson of Clamoak, Helstone, in Bere Ferrers parish, is reputed to have been the first to send Double White narcissi to market in 1880. This famous Tamar Valley narcissus is now gradually disappearing, as it does not take kindly to field cultivation and is prone to produce "deaf" (abortive) buds. At first,

all bulbs were grown on the "hedges", since the fruit ground was thought to be too valuable to waste on them, but in 1909 one grower at St. Dominic started treating them as a serious crop and planted some *Gladiolus nanus*, The Bride, together with double white pinks. Arum lilies were introduced as a glasshouse crop at Calstock between 1905 and 1908, while at Cargreen, a flourishing flower-growing industry for supplying Plymouth was built up with violets, wallflowers, stocks, white pinks, various summer flowers and, for autumn, dahlias. The latter were at first more popular locally than chrysanthemums, which began to come into their own about 1905. Since then they have been widely grown in Cargreen and Saltash, both out of doors and under glass, for the Plymouth market.

Narcissi, however, were the main Tamar Valley flower, and the district became noted for its *poeticus* varieties, which succeeded exceptionally well under fruit trees. Only a few anemones and no violets or annual flowers were grown before the Second World War, so that when a reduction of the flower acreage to 25 per cent of the 1939 area was required by the war-time Horticultural Cropping Order, Tamar Valley growers were called upon to make real sacrifices. Some recompense for this big reduction was, however, that many old stocks were cleared out, and growers were able to make a fresh start with newer varieties after the war. Today, when all the standard market varieties are grown, there is a much bigger demand for "yellows" than for the old *poeticus* sorts. Eelworm threatened the whole narcissi-growing industry in the 1920s, but hot-water treatment saved the day. Bulb fly has become particularly virulent since growers started to plant bulbs on the warm slopes instead of under trees.

Another important development since the last war is anemone-growing. Anemones are now grown on almost every holding in the area, and are particularly important since they provide both work and income in the winter. Previously, many smaller growers cleaned up their gardens in the autumn and then sought part-time work until it was time to cultivate their bulb and strawberry land in the early spring. The appearance of Downy Mildew of anemones, necessitating long rotations, is therefore viewed with great concern by the small anemone grower.

Practically all the flowers grown in the district are sent to distant markets —the Midlands and north of England particularly. In 1937 some 200,000 boxes of flowers were dispatched by rail: in the 1953-54 season the figure had risen to 372,309 boxes, valued at possibly £140,000-£150,000.

Local and Distant Markets It has already been pointed out that the Tamar Valley growers have two outlets for their produce—Plymouth and the distant markets. Formerly, Devonport market was an extremely good one. Some growers had their own horse wagons, and they would set out from St. Dominic on market days at three o'clock in the morning to catch the five o'clock ferry from Saltash. They reckoned to take the 8.45 a.m. ferry back and spent the remainder of the day working on their holdings. Much produce was also taken to Devonport by boat, whence road carriers took it to market.

Fruit was carried from the St. Dominic and southern areas to Saltash station by horse wagon, except for a short period when a special rail service encouraged dispatch from Bere Alston. Calstock produce was either taken to Tavistock railway station or distributed to local markets in Tavistock and Launceston, until the opening of the viaduct in 1908 enabled direct loading on to the railway. Lorries have gradually replaced horse transport, and an efficient collecting system is now operated for growers.

Despite these advances, marketing and transport still present great prob-

lems today. Frequent and very early morning pickings are often difficult, and warm or over-ripe fruit travelling in vans that are hot at loading time results in fruit arriving at the market in poor condition. Valuable experiments carried out at Bere Alston have shown the value of cooling and of carbon dioxide in delaying deterioration. If transport in refrigerated vans charged with carbon dioxide could be made available in this country, vast improvements would result.

The Tamar Valley has been well served in the past by its county councillors, who have been outstanding protagonists of agricultural education. In 1925 the Cornwall County Council, through the initiative of its horticultural organizer, Mr. H. W. Abbiss, established a 5-acre experimental plot at Ellbridge. This has since served as a trial ground, a fount of new ideas, and an advisory centre. Today it is a sub-station of the Ministry's Rosewarne Experimental Horticulture Station. Shows, notably the Tamar Valley Spring Flower Show, have also played their part in helping to improve the packing and presentation of produce, and Tamar Valley flowers now have a very good name in the market for quality and packing.

Present Problems and the Future Two main problems face the grower today. First, to combat soil-borne pests and diseases, such as eelworm, Red Core disease of strawberries, and Downy Mildew of anemones, long rotations are necessary, and alternative crops that can be grown suitably and profitably are hard to find. Secondly, there is the difficulty of obtaining the bulky organic manures necessary for the maintenance of fertility. It might seem that the answer to both these problems is for the horticultural crops to be grown on larger farms; but, topographically, land suitable for agricultural working is usually too exposed for horticultural crops, which must be early if they are to be sent to distant markets. Once, Tamar Valley fruit was the earliest of its kind, or at least immediately followed that from the very earliest districts. Today not only is internal transport becoming more difficult but world transport also makes much fruit available all the year round.

Bearing in mind all these difficulties, the conclusion is that there is still a place for the family holding, for such growers are able to pay the closest attention to detail and to present an article that is just that little better than the mass-produced. Moreover, they may be able to pull in their horns during periods of adversity, which larger growers with fixed labour charges cannot do, and just so long as they are fired by the thought which inspired the pioneer growers—that to be one's own master is a goal worth both toil and hardship—they will surely survive.

References

1. D. J. Goodchild. *Horticulture in the Tamar Valley.* Horticultural Education Association Annual Report, 1954.
2. Geoffrey E. H. Grigson. *Freedom of the Parish,* 1954.
3. Alfred Pengelly. *The Inside Story of Calstock,* 1955.
4. Account of Mr. J. W. Lawry's Farm, Bohetherick. *J. R. agric. Soc.,* **51,** 812.
5. Lyson's *Magna Britannia.* Vol. 3 (Cornwall). 1814.
6. *Lake's Complete Parochial History of Cornwall,* 1867.
7. *The Victoria History of the Counties of England—Cornwall,* 1906.

MILK AT LOWER COST

CLYDE HIGGS
Stratford-on-Avon, Warwickshire

Higher returns for the dairy farmer depend upon lower costs. But, suggests Mr. Clyde Higgs, there is ample scope, given efficient management and sensible use of modern ideas and equipment, for reducing the costs of production without sacrificing yields.

A LIMIT has been put on the support—now running at £30 million annually—which the Government is willing to give to milk producers. There is little likelihood of higher returns to the farmer, for a rise in retail price might well depress liquid sales, and so seriously affect pool prices. The only solution left to dairy farmers—and we cling to the monotonous and arduous routine because of the regular payments and orderly marketing—is to lower costs.

This suggestion does not mean lots more cows giving less milk because they are poorly fed and badly managed. It is far better for every farmer to do with one less cow in every ten and turn out the same quantity or more. Dairying on any scale is a very personal job, there can be nothing arbitrary in an industry where there are such wide variations in size of herd, breeds, conditions, buildings, and management. So everything written here is general and must not be used in evidence against one who has vacillated from three cows hand-milked in an adapted old-fashioned shed, through a steel and concrete contraption housing a gross of animals, to open-air bails outside always, and who is now using these same bails for the grass-growing months in conjunction with covered yards in the winter.

Looking Back My original cowshed was ill-lit and the ventilation was so poor that the cows breathed in avidly through holes cut in the brickwork at manger level. It would have horrified any County Milk Committee. Milking with a bucket-type machine up and down a three-foot gangway, feeding by passing between each pair of animals (for there was no front passage), and cleaning out—all were wasteful of labour and tiring to the men, particularly when the shed grew to hold sixty animals in a single line.

Then I thought of time and motion. A four-bay Dutch barn-type building 120 feet × 90 feet accommodated 144 cows in double rows in three bays. The dairy and milking parlour were in the fourth bay. There were no mangers; each animal had her feed naturally on the floor. Actually, the fast-eating, greedy ones stole from their neighbours. Bowls made things little better because the cows soon learned how to move them. Stop-and-go lights regulated the traffic to washing stalls, which were supplied with hot and cold water. There were twelve milking points, each with a glass container, from which the milk was carried through a stainless steel pipe to the dairy. Milking was done three times daily, at 5 a.m., 1 p.m. and 9 p.m. Milkers did two shifts, changing over weekly. Unfortunately, the idea did not work, for casualties in men and animals were very high. The speed was too great for them!

The pendulum then swung to the other extreme—outdoor bail milking. But all-the-year-round use of bails brought very little milk in the winter when the cows used most of their food to keep themselves warm. The system is ideal for cheap summer milk from a herd which is dry for the winter

months and calves within a few days in spring. Not that I encourage high yields obtained expensively by feeding masses of imported cake. My production must be as level and economical as possible. Now the cows go into covered yards when the cold weather comes and the grass stops growing. This, so far, is the best arrangement, but there is room for improvement. More accommodation is needed to make the cows really comfortable, and individual feeding with quick-release yokes in the yards is essential. That means more capital expenditure which could be recovered from income tax payments and would also help to lower costs.

Reviewing the outfits which I have had, it is fair to say that for the small herd there is nothing better than the traditional cowshed built on modern lines with all labour-saving aids. For large herds, covered yards and parlours are best, provided that they are designed from the start with the idea of making labour go as far as possible and letting workers be as comfortable as they can in such a monotonous job. The competition for good cowmen (or will they soon be called milking technicians?) increases, and the threat of a seven-day week deters young aspirants. But time off on the big holdings is not difficult to arrange and it is usually cheaper than overtime. On the small farms, however, it is a problem. The idea of an itinerant relief among a group of farms fails because, if he is any good, he is tempted to permanent employment on one of them.

Wise Choice of Equipment If cowhouses need serious improvement it is sensible to consider a new building to meet present-day needs. Too many existing cowsheds are out of date and add materially to production costs. Funds for such work are available at reasonable interest rates, and it does not take too long to recover the interest and reduce the loan out of improved methods. In any new building much thought should be given to manure handling. The job is so efficiently mechanized with fore-loaders, tipping trailers and spreaders that the provision of room for the implements to work comfortably inside the shed will result in considerable saving.

Milking machines, performing the final operation on the milk trail which may have extended over months or even years, are a fruitful cause of loss, not because they are badly designed (in fact, most of them are very good), but through lack of proper attention. Too many machines for one operator result in slow milking. Too little concentration will ruin cows. Unfortunately, it is a case of animals, each with her likes and dislikes, in contact with machines which have no feeling. It is the operator's duty to hold the balance, and it needs a well-trained and quick-witted man to assess the day-to-day animal changes and adjust the inflexible machine to them. Hand- is not superior to machine-milking, but the milker tires. Efficient milking does materially affect costs, and I should like to see qualified operators given certificates which would entitle them to higher pay—they are worth it!

Electricity ought to be used more generously as a cost-saver on dairy farms. We are not so well served as in Denmark, where only 3 per cent of the holdings are without a supply. But many of our installations are only partly used. Light in the house, an iron, television, a light of a sort in the cowshed, and a motor to drive the milking machine, by no means exhaust the profitable uses. Too much lifting is done manually—a relic of the time when farm workers were proud of their ability to hump three-bushel sacks. Such work can be done better and more cheaply by electricity. If the rich potash from cowsheds must be wasted down the drain, an electric pump is best. Electric fences have become a factor in better farming, not as a substitute for permanent fences, but for controlled grazing of grass or fodder crops. Now they are available with mains connections, the bugbear of

battery-charging has gone, and complaints that cows ignore the shock should be less frequent. Electric fences need management: they require proper erection and continuous maintenance, for one stray grass stem may release a herd of cows.

Efficient Animals Cheaper milk is most likely to come from efficient animals, regardless of their breed. Those who have a choice ought to be influenced by the possibility of payment for butter fat. Already, cleanliness is assessed on monthly samples, and there seems no reason why the same system could not be used for fat determination. With specified areas and channelled supplies, there should be no difficulty in supplying liquid milk to a regular standard, retaining any surplus cream for sale as such or for manufacture.

The terrific progress of artificial insemination in twelve years in this country has materially affected milk production costs. Not only have bulls in small herds been replaced by cows but, in addition, milk averages have been raised by the use of good bulls. I cannot subscribe to the idea that dairy farmers should be content to maintain only milking cows and depend on outsiders for replacements. The sure way of improving milk records is by cultivating a strain within the breed. Even with widening attested areas, a self-contained herd is part insurance against disease—a fact which is not evident from bare figures.

Most bovine diseases, except the latest trace element troubles, are now under control, provided the rules are kept. S19 vaccine is fully efficient when used on calves and before service. Penicillin and its partners have taken the terror out of some kinds of mastitis. These make a great contribution towards lowering the cost of milk. Recording, even privately done, is an essential to good production. And I am going to add de-horning as a modern aid to dairying efficiency. My calves are done electrically when a few days old. As a result, both young and old live amicably together, take less shedding and, I am convinced, give more milk because they are less nervous. I look forward to buying my first naturally-polled Ayrshire bull. If he is not available soon, I shall be tempted to buy a polled bull of another breed and so ruin my pedigree herd. Would it matter? Would they give less milk?

Dual-purpose dairy breeds should have the best of both worlds. During the drive for more milk regardless of cost, my surplus heifer calves and many bull calves met a keen trade. Then came the slump, and they fetched meat pie prices. Now a Hereford bull has altered matters. He is used only on heifers. His progeny qualify for the calf subsidy and sell well as stores, for finishing beef is too intricate for a dairy farmer and far less profitable than store selling.

Economic Feeding Food is the main item in dairying costs. The shibboleth of self-sufficiency has gone, yet low cost production is most likely to come from maximum efficient use of home-grown foods carefully supplemented by a minimum of bought cake. But one cannot be dogmatic about this. The first free marketing season for many years showed favour of those farmers who sold their grain at the right time and replaced it with imports.

I am doubtful if farm food mixing is really worth while. In small lots, under the master's eagle eye, it may be all right, but larger quantities produce those problems which can only be settled individually. Some farms are well enough equipped to do the work, yet it is often more economical to let a nearby mill supply the extra ingredients and mix them, so releasing farm men for farm work.

MILK AT LOWER COST

Grass is a basic food which nothing can replace—and we make far too little use of it. The more grass is worked, the more it produces. Controlled grazing of a vigorous and well-fertilized ley is a great help to lower milk costs. Most farmers have too much grass in the flush time. Instead of conserving it as silage and afterwards taking a hay cut, the whole crop is left to produce bulky and low quality hay. Silage-making is a simple process and a good food comes from decent material. My mobile pits are strategically placed to reduce carting. Self-feeding, in my opinion, is a gross waste of good food, and while it may save a bit of labour, it cannot help to reduce costs. I continue to make some dried grass, not with any enthusiasm, but because the outfit is there and might as well be used. Tripoding will give very much the same results at infinitely lower costs. Certainly tripoding takes more labour than traditional methods, but it produces a quality food—and quality is imperative in reducing costs.

Kale is the best substitute for grass. Not so long ago it was a chancy crop, and in spite of rolling, drawing paraffined bags, or sprinkling soot, many fields were resown again and again. Now a chemical dressing on the seed has stopped all that. A succession of crops can be put down to provide succulent fodder for harvesting from early autumn to late January. There is no virtue, except weight, in the tree-like plants which decorate seedsmen's stands. Controlled grazing, using an electric fence, does save labour if the conditions are right, but a herd of cows trampling on heavy land in wet weather can seriously affect the following crop.

Roots for cows are expensive but often worth the money, not for their feeding value but on the apple-a-day principle. Tractor-mounted hoes and gappers are reducing costs, and soon we may be able to plant each seed where it is wanted and so reduce hand work still further.

I have been producing milk for a long time, and the more I see of dairy farming the more intricate I find it. Fortunately, now we have an advisory service covering every aspect of the business, full use of that, coupled with common sense and efficient management, make the dairy farming outlook bright—particularly if we can lower costs.

Some Articles of Outstanding Interest

● **NEXT MONTH** ●

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Place an order with your newsagent and make *sure* of your copy.

A MILK PRODUCER LOOKS AT HIS MARKET

W. R. TREHANE, B.Sc.
Vice-Chairman, Milk Marketing Board

We drink twice as much milk today as we did forty years ago. But we still lag behind many other countries in this respect, and Mr. Trehane here considers some of the future aims and problems of the British milk industry, geared as it is to production for the liquid market.

MILK producers, like most farmers, have not had to concern themselves for fifteen years with the question—once so vital—of whether they could sell what they produced. Even now the ordinary producer, taken up with the manifold cares of his job, probably does not pause longer than to hope that the Marketing Board, upon which he has come to rely, will take care of his production day after day, year in, year out. Nevertheless, as the growing freedom of trading opens our frontiers more to imports and as price supports become less specific, it may be prudent to look around us and ahead to try and determine the plans that affect the future.

Markets are never static. They change in response to many factors, amongst them changes in population, the dietary habits of the people, prices in relation to other foods, the pattern of international trade and the development of competing sources of production. A hundred years ago the production of milk for sale from farms was insignificant, being virtually confined to a few farms on the outskirts of the smaller towns, and to supplying, as an incidental, the very small needs of those of the rural population that did not have a few acres and their own cow. The chief interest of the farmer in the liquid milk market was the production of cows for the town dairies and the growing of fodder and straw to serve them. Otherwise, farms that kept cows did so mainly for butter and cheese-making, and coupled this enterprise with pig-keeping; the actual management of these cows and their produce was largely let out by the farmer to other people.

We drink more Milk . . . Today production of milk for sale is the largest single enterprise of British farms. What has contributed to this remarkable development? Firstly, the population has increased until it is roughly two and a half times that of a hundred years ago. At the same time, it has become much more urbanized, so that fewer people are actually obtaining their living from the land today. A much better standard of living has enabled the people to indulge their natural wish for better food and more of it, and changing conditions of work have made this the more possible; there is more time for meals at home and many workers have catering facilities at their places of work. In general, rising standards of living and greater enlightenment about diet have been accompanied by a trend in favour of protective foods, at the expense of cheaper, starchy foods, as the following table shows (although some of the commodities have been affected by shortage).

Consumption of Food in the United Kingdom (per head per week)

		1909-13	*1934-35*	*1954*
Milk and cream	*pints*	2.5	2.8	5.0
Meat	*oz.*	41.3	45.0	31.7
Eggs	*no.*	1.9	2.9	4.3
Potatoes	*oz.*	74.9	68.0	67.9
Fresh fruit	*oz.*	19.0	35.7	36.5
Vegetables	*oz.*	22.1	35.5	36.2

Contributing to this change, and indeed making it possible (perhaps particularly in the case of milk), have been the great developments in transport and food manufacture, processing and distribution.

Even in the twenty-five years that cover the immediate pre-war years until now, milk consumption patterns have changed. In the ten years before the war, the amount of milk consumed per head per week rose slowly from 2¼ to 3 pints, but thereafter the figure increased much more quickly, until by 1951 weekly consumption exceeded 5 pints. There was subsequently a fractional decline from the peak, but for the last two years consumption appears to have been stabilized at about 5 pints, or 60-70 per cent above pre-war levels. The greater part of the increase has occurred amongst the lower paid groups as the following comparison, in descending order of income, shows:

Income Group	Crawford and Broadley Survey, 1936-37	National Food Survey, 1952
	pints per week	*pints per week*
A	5.0	5.1
B	4.4	3.9
C	2.6	3.7
D	1.6	4.1
All groups	2.9	4.0

. . . but not Enough These figures are an interesting commentary on the changes in income in the past twenty years. At the same time, they pose a challenge to the industry, showing as they do that having reaped the advantage of the removal of the biggest bar to increased sales—insufficient income— there remain other and more difficult problems if milk consumption over all groups of income is to be increased.

Milk consumption in the United Kingdom is still well below the levels recommended by nutrition experts. These levels may be summarized by the findings of the League of Nations Advisory Committee on Nutrition in 1937, as follows:

	pints per day
Children	1–2
Expectant or nursing mothers	2
Other adults	½

Other countries are well ahead of us in this respect:

Consumption of Liquid Milk in 1953

	pints per week
Sweden	7.3
New Zealand	7.2
Netherlands	6.8
Canada	6.2
U.S.A.	5.3
United Kingdom	5.0
Denmark	4.4
Australia	4.2

Conditions in the countries that have a higher consumption than our own have been investigated closely. One factor stands out in all of them—the use of milk as a beverage is much more common and far more extensive than it is here.

Production Geared to the Liquid Market These are some of the changes that have taken place in our market in recent times, and comparisons with what has been achieved elsewhere and perhaps should be achieved here. Production in Britain has followed demand, as the figures overleaf show.

Production and Use of Milk, England and Wales (million gallons)

Oct.-Sept.	Total Sales off Farms	Used for Liquid Consumption	Manufactured
1933-34	856	643 (75%)	213
1953-54	1,678	1,344 (80%)	334

Today we face the future with a greatly increased production of milk, geared to and dependent on an expanded liquid market. On many of our farms milk production has become a specialist enterprise and the cornerstone of the whole pattern of farming. Particularly is this so with the smaller farm which, traditionally, relies for its turnover and income upon high output livestock enterprises such as milk, eggs and pigs.

In 1924 the Linlithgow Committee stated:

> Whilst every branch of industry and commerce has been organizing on a wholesale scale, the British producer has, in the main, been content to pursue the methods which prevailed before this country became the principal market for the agricultural produce of the world. In the new circumstances of world competition, a knowledge of the marketing and distributive processes is essential to the producer. Only when thus informed, can he adapt his methods of production, the goods he produces, and the preparation of these goods for market, to the needs of the buying public. This, together with a capacity to compare values and judge prices, is the marketing sense. It is possessed by the more progressive agriculturists, but if the British producer is to occupy his proper place in the home market, it must be cultivated more generally.

If, in the light of this dictum we, as milk producers, are better able to face the future than our counterparts of 1924, the credit must go to those who twenty-two years ago saw the need for a producers' marketing organization and took the steps to establish it. Without it, the whole process of marketing would be more perilous and we should have no means of market intelligence, nor indeed of ascertaining the problems of the market and adjusting our methods thereto. Today we have the added advantage that the manufacturers and distributors have joined with the Board in joint committee, so that the knowledge and experience of the whole industry are available in common purpose.

The basic problem of the British dairy farmer in producing for the market is the dominance of the day-by-day, unceasing need of 50 million consumers for their liquid milk requirements. This imposes a production pattern on the industry that is stringent and costly. A pure theoretician might say that because of this necessary high cost structure, we should only seek to produce in these islands exactly that level quantity which the liquid market requires, leaving the summer producers overseas, with their lower costs, to supply our requirements of butter and cheese. But we know that good years and bad can affect production and that the seasons of the year also have their effect. It is essential, in order to safeguard the supply for the liquid market, to budget for a surplus of 10 or 15 per cent at the lowest point of output. The most profitable utilization of that surplus is second only to the fostering of the liquid demand in its importance.

The Way Ahead Our problems then are these. Firstly, because we are geared to the liquid market at necessarily high cost and because of the relative size of that market, our first aim must be to sustain and expand liquid demand. Hence the present publicity campaign, in which producers, distributors and manufacturers are partners. Its aim is to make the public conscious of the great value of milk and, while not neglecting the many other uses of milk, particularly to secure recognition of milk as a beverage. The consumer has to be educated to the fact that, when well served, it is a delicious drink with great protective qualities, making up for deficiencies in the diet and sustaining the human body against stress.

Secondly, to produce for those manufacturing markets that show us the best return. These are primarily cream, milk powder, condensed milk and milk for chocolate. Over and above these products we should probably only aim at producing sufficient to supply that part of the cheese and butter market which will pay a premium for the best characteristically English produce. At the present time these premiums are high. We must be careful to preserve them by producing only the best and making sure that marketing is so skilfully and painstakingly conducted that every possible realization is obtained. Our own cheeses have a great reputation but they are not sufficiently widely appreciated. We intend to do all we can, by a publicity campaign, to remedy that, but in this field and in marketing development there is much to be done.

But so far as can be seen, as the efficiency of production continues to improve, production of milk must expand unless and until other branches of farming are markedly more profitable. If this occurs, to the point where it outweighs what can be done to improve the liquid market and make the most of manufacture, or if the proportion of manufactured milk increases greatly, then realizations—or the net price of milk—will fall.

Thirdly, therefore, if these circumstances occur, we shall maintain the prosperity of the industry only if we can lower our costs, both of production and marketing. We can obtain great encouragement for the future from what the industry has already achieved in this way. It has already demonstrated, both in production and marketing, its capacity to absorb additional costs equal to many millions a year.

MINISTRY OF AGRICULTURE EXHIBIT ROYAL SHOW, NOTTINGHAM, JULY 5-8

Stand No. 340 Block 10 Avenue D

Better Management—Better Business

Farming today is as much a business as any other industry, and only by using his resources wisely and to the full can a farmer make a success of his enterprise. This is the main theme of the Ministry's exhibit at this year's Royal, and most of the exhibits in one way or another are designed to show the road to profitability by better management.

A 129-acre farm on the borders of Leicestershire and Derbyshire is taken as an example of what can be done: here, in eight years, the farmer's yearly profit has increased from £180 to £1,200, simply by good management. For *grassland farmers*, the results of a recent comparative trial point to the wise use of both roughages and concentrates in the feeding system. There are also exhibits on the better management of grass and the reclamation of pasture after rabbits have been eliminated by myxomatosis.

Another part of the demonstration emphasizes the need for early control of lice and mange on cattle housed and yarded in winter.

Arable farmers will be particularly interested in the exhibits on cereal varieties and economic top dressing with nitrogen, a comparison of new and established varieties of early potatoes, and the latest information on the control of virus yellows in sugar beet.

Guidance is given in other exhibits on the installation of a drainage system on the farm, and on the correct methods of storing grain to prevent infestation. Examples of a new building planned for the mechanized farmer and an old building converted to a potato store, both permitting easy road access, will appeal to the farmer who is finding efficiency impaired by bad layout of buildings or unsuitable roads.

Finally, for the *poultryman*, there are exhibits on levelling-up egg production, conversion of existing buildings to an intensive system, and the prevention of coccidiosis.

EFFECT OF BLIGHT ON YIELDS OF MAINCROP POTATOES

A. E. Cox, B.Sc.

National Agricultural Advisory Service, Eastern Province

In the light of his experience in north-east Essex, the writer examines the question of crop yields in relation to protective spraying and the time of season when Potato Blight makes its appearance.

A DISCUSSION on the necessity for protective spraying of potato tops against blight can best be started by considering the rate at which maincrop potatoes bulk up. One account of the increase in yield of maincrop potatoes over the course of the season, based on studies of 63 crops of Majestics over the years 1940-45, has been given by Doncaster and Gregory (1). These crops were grown at centres throughout England and Wales. Fig. 1, which is based on Doncaster and Gregory's data, shows typical yield increase curves for the years 1940 and 1945. In neither of these years was blight a serious problem.

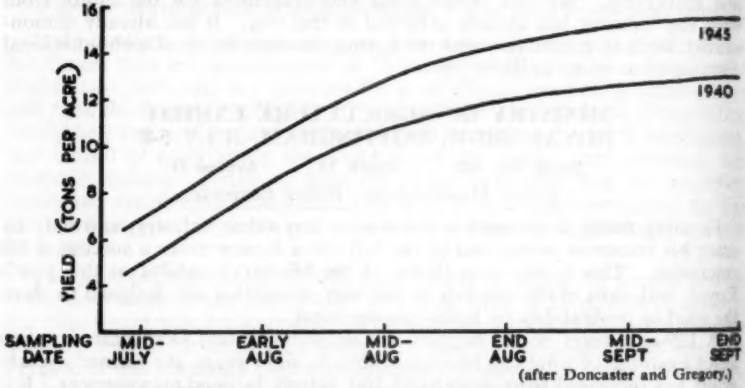

Fig. 1. Yield increases in crops of Majestics, 1940 and 1945

As a result of these trials, the general conclusion was drawn that the period of most rapid tuber increase is usually August, and that in September the increase is normally much slower. During August the yield may be improved by as much as 1-2 tons per acre per week.

It at once becomes obvious that in years when blight attacks do not start until the end of August or later, protective spraying of the potato haulm with copper fungicides can have little effect in increasing yield. In fact, spraying is more likely to depress the out-turn, chiefly as a result of the damage done to the crop by the passage of the spraying machine. In addition, there may be direct copper damage to the foliage, particularly in dry seasons or if there is insect injury.

Another practical aspect of this problem is that yield loss following premature death of the haulm through Potato Blight can, to a certain extent, be countered by early planting and sprouting of the seed tubers. In other words, by forcing the potato plant to complete its life cycle earlier than it would normally do, the effect on yield of a late attack of blight will be less severe, or even negligible.

EFFECT OF BLIGHT ON YIELDS OF MAINCROP POTATOES

Slow Initial Development of Potato Blight Considering the two most commonly grown maincrop varieties—King Edward and Majestic—the first outbreak of blight is almost always found in the former. The attack on Majestic occurs later and proceeds more slowly. During 1954 I kept records of blight increase on the haulm of a number of crops of unsprayed King Edwards. Fig. 2 shows the blight increase curve for an unsprayed crop of this variety grown a few miles to the east of Colchester.

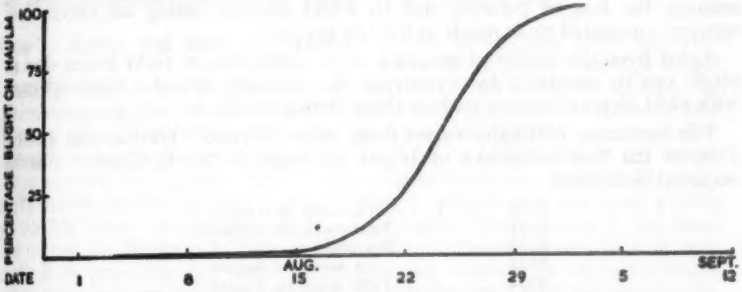

Fig. 2. Blight increase in 20-acre crop of Unsprayed King Edwards, Colchester, 1954

Throughout the period covered by this curve (Aug. 3–Sept. 7), the weather was suitable for the spread of blight. In some seasons a hot, dry spell intervening after the blight has started may arrest the disease, and destruction of the haulm may thus take correspondingly longer. According to Large (2), however, it is rare under any circumstances for the disease to run a course of less than a month.

Fig. 2 illustrates some important general facts about blight development. The early progress of the disease on the tops is slow. In this case, two weeks passed between first finding blight in the field and the 5 per cent level being reached. However, once an appreciable amount of blight has built up in the crop, the tops are destroyed very rapidly, provided the weather is suitable.

Farmers are very often under the impression that blight can destroy a crop almost overnight. This, of course, is manifestly impossible; such a conclusion is probably reached because the presence of the disease is not recognized until somewhere around the 5 per cent level has been reached. Careful inspection would, in fact, have revealed it some considerable time before.

Effect of Protective Spraying on Crop Yield The effect of blight on crop yields is governed by two main factors—the time of the outbreak (that is, whether early or late in the season), and the speed with which blight destroys the haulm. Large, in the article already referred to, accepts provisionally the estimate that useful tuber growth ceases when the blight assessment on the tops reaches 75 per cent. This estimate provides a useful datum line for the calculation of approximate yield losses due to the destruction of the potato haulm by blight.

Some conclusions drawn from spraying trials on King Edwards at Terrington (3), near the mouth of the Wash, between 1948 and 1953, give a very good idea of the increase in yield to be expected from spraying in relation to blight level on the potato tops. When the 75 per cent blight stage is reached by the middle of August, there is a probable gain from efficient

spraying of 2-3 tons per acre on the heavier crops, but when the 75 per cent stage is not attained until the end of August, the probable gain is about 1 ton per acre. In years in which the 75 per cent stage is not reached until mid-September, any possible gain from spraying will be lost by wheel damage.

In any event, the full potential loss due to blight cannot be made good by spraying, since some damage will be caused by the machines passing through the crop, and there may also be copper damage to the foliage. At Terrington, where crops not infrequently total as much as 17½ tons per acre in good seasons, the loss of potatoes due to wheel damage, using an eleven-row sprayer, amounted to as much as 0.8 ton per acre.

Apart from the results of spraying trials, approximate yield losses due to blight can be estimated by comparing the shortened life of a blighted crop with yield increase curves, such as those shown in Fig. 1.

The incidence of blight varies from year to year. During the period 1950-54 the first outbreaks of blight recorded in the Colchester district occurred as follows:

1950	...	...	First week in August
1951	...	...	First week in September
1952	...	...	No blight
1953	...	...	First week in August
1954	...	...	First week in August

Observations on seven crops of unsprayed King Edwards throughout the district in 1954 showed that the 75 per cent blight stage was generally reached in the last week of August. Bearing in mind the Terrington conclusions, it would appear that efficient spraying of King Edwards in 1954 in north-east Essex would not have increased the average crop by more than 1 ton of tubers per acre. This statement appears to have been borne out in practice, since, despite the early death of potato haulm throughout the district, good crops of King Edwards, averaging somewhere around 11 tons per acre, were lifted.

Again taking the 1950-54 period, for which records exist, spraying of King Edwards would not have been justified in 1951 or 1952 in the Colchester district. In the remaining three years, the probable gain from spraying would most likely have been about 1 ton per acre. Time of planting will, of course, have a modifying effect on individual cases and will determine the extent to which spraying is likely to benefit the crop.

Danger of Infection on Lifting Paradoxically, the greatest losses to the farmer from blight often occur in years when the attack is late and its effect on yield is negligible. Thus in the 1950-54 period, probably the greatest loss of potatoes in north-east Essex took place in 1951, when blight was first reported in early September. This was due to direct infection of the tubers at lifting time by coming into contact with blight still active on the potato haulm. The result was extensive loss through rotting in the clamp.

Tubers are infected with blight in two main ways—by blight spores carried down from the potato tops by rain through cracks in the ridge, and by direct contact with infected tops at lifting. The first-mentioned method of infection may be over-emphasized. Good earthing-up is essential, but provided this is carried out, infection of the tubers in the ground should not be high. In the Colchester district in 1954, a quick survey of King Edward crops at or after lifting found that the blight percentage in the tubers was in no case greater than 5 per cent, and on most farms it was less than this. Yet the tubers of these crops had been growing under infected tops for periods of three weeks or more in fairly continuous rain.

It should be stressed that spraying the tops with copper compounds will not prevent this type of tuber infection, since the effect of spraying is to delay the progress of the blight on the tops and not to prevent it completely. These remarks on tuber infection by way of the soil must be further qualified by noting that different varieties vary in the susceptibility of their tubers to blight. King Edward is moderately susceptible; Majestic is less so; Gladstone and many second early varieties are more easily infected than King Edward. Tuber infection at lifting can be prevented by burning off the tops with acid or similar material two weeks before lifting starts.

When to Spray and Burn Off Haulm To cut production costs and prevent loss of tubers through wheel damage in years when blight attacks are late or do not occur, the question of routine spraying should be reviewed. A first spraying should be given before the rows meet in the drill, when the damage done will be very small, but subsequent sprays should ideally be given only if blight attacks the crops. Circumstances will greatly modify this recommendation, which will apply chiefly to the smaller grower equipped with a sprayer who can keep a keen eye on his crop. In districts such as north-east Essex, where it has been shown that the likely gain from spraying King Edwards in any year is only small, it is probably not worth while spraying Majestic at all, since blight occurs later and proceeds more slowly in this variety. It is, however, more important to spray a late maincrop variety like Ulster Supreme. Of equal importance, of course, is choosing the right time to spray. Very often a farmer recognizes the presence of blight in his crop at around the 5 per cent stage and wants to know whether to spray. The answer is that it is then too late for effective protection, and spraying may give only a slight check to the progress of the disease.

Finally, comes the question of when to kill the tops of a crop infected with blight. This should be done at the 25 per cent blight stage, or, in the case of a late attack, two weeks before the farmer wants to start lifting. Killing off the haulm before the 25 per cent blight stage in an early attack of blight appears wrong. It is sometimes done by the farmer to prevent infection of the tubers in the soil, but any small gain in sound tubers which he may obtain in this way will be outweighed by a loss in potential bulking. Leaving beyond the 25 per cent stage is unlikely to be worth while, since from then until the 75 per cent stage, when tuber growth is considered to cease, will normally be a very short time. Soil type and rainfall may modify these statements, but in my own district I have found that good earthing-up has been the chief factor in minimizing tuber loss through blight, rather than the exact stage at which the haulm has been burnt off.

It might well be argued that in the case of an early attack of blight, when the tops would be dead by early September, there is no point in spraying acid at all. Against this, however, must be set the advantages of a decreased risk of tuber infection in the soil, the destruction of weeds (particularly chickweed), and the fact that the destruction of the potato stems makes for easier lifting.

References

1. The Spread of Virus Diseases in the Potato Crop. J. P. DONCASTER and P. H. GREGORY. *A.R.C. Report, Series No. 7.*

2. The Interpretation of Progress Curves for Potato Blight and other Plant Diseases. E. C. LARGE. *Plant Pathology*, 1952, 1, 109-17.

3. Spraying Trials in the Potato-growing Area around the Wash, 1948-53. E. C. LARGE, R. E. TAYLOR, I. F. STOREY and A. H. YULE. *Plant Pathology*, 1954, 3, 40-8.

FARMING AFFAIRS

Co-operative Smallholdings Capital looms large as an item in the programme of the prospective young farmer today, and lack of it may well stifle, at least momentarily, the enterprise of many who would like to set up on their own account. When, therefore, there exists an opportunity of farming with limited capital on a co-operative basis, offering a net income of over £500 a year, it ought to be the centre of a good deal of interest.

Such a scheme has, in fact, been conducted successfully by the Land Settlement Association for twenty-one years. Originally, when the Association was set up in 1934, the main driving force behind the project was the serious unemployment at that time. Today, however, the objectives are twofold: to give the man with limited capital a chance to set up on his own account; and to prove the value of co-operative action. To this end, the Association administers 18 estates on behalf of the Minister of Agriculture, involving 8,963 acres of land split into 958 fully-equipped smallholdings. Of these, 796 were occupied by full-time smallholding tenants at the end of March 1954, the remainder being accounted for by staff and other tenants. The average size of a holding is about 5 acres.

Each estate has a manager and staff and is equipped with a central depot, offering such organized services as a packing station, sales store (which provides for bulk purchase of feedingstuffs, fertilizers, etc.), accountancy service, propagating unit and implement pool. The general plan of production is based on poultry, market gardening (mainly salad crops) and pigs, but within that layout each smallholder has the opportunity to pursue the branch he prefers, subject to the limits of good husbandry.

The Annual Report and Accounts of the smallholdings for 1953-54* show that for the tenants who were in occupation for the full year up to December 31, 1953, the average net income amounted to £544. This figure does not take into account loan repayments and charges due from the tenant, or the value of the produce consumed by his family. Total sales of produce amounted to over £1,363,500, giving an average per tenant of just under £2,000. Income was fairly evenly divided between the three main sources of revenue—poultry and eggs, pigs, and horticultural and agricultural produce.

For the first time, the centralized services were required to be financially self-supporting. Not only was this object achieved, but a surplus of over £27,000 was made, of which £13,000 has been allocated for distribution to the smallholders. Although this was a most satisfactory result, the surplus amounts to no more than 1 per cent of the total turnover, and it is a small margin on which to work. Nevertheless, the fact that the services have been proved capable of operating as a commercial enterprise, together with the rising trends of sales and the atmosphere of mutual confidence and effective collaboration between the tenants, augurs well for the future of this unusual experiment in co-operative farming.

Farm and Forest:
3. Layout and Choice of Species for Shelter-belts A "belt" is not necessarily the most efficient shape to provide shelter for stock: squares, diamonds, L- or kidney-shaped blocks, or the "Manx leg" formation are all useful, and the last-named has the advantage that it will provide shelter no matter which way the wind blows. A belt is also the most expensive shape to fence. When choosing the species to be

* Smallholdings Organized on the Basis of Centralized Services; Report and Accounts for the Year 1953-54. Obtainable from Sale Offices of H.M. Stationery Office, or through any bookseller, price 1*s.* 3*d.* (1*s.* 4½*d.* by post).

used, a decision must be made as to the degree of permeability required, bearing in mind that trees grow through various stages—in youth the dense stage; in middle age the semi-permeable; and, at maturity, usually too open. It is necessary also to consider the provision of a shrub layer to prevent draught at ground level, and, since even trees cannot live for ever, to give some thought to the question of permanence. The last can be achieved by planting the width in two stages, by planting the whole in one and then underplanting and gradually removing the over-drop, or by various combinations of these principles.

Free advice as to the most suitable species can always be obtained from the local Conservator of the Forestry Commission. The choice will vary with the degree of exposure and the soil conditions. In hill country, for example, four main species may be considered. Japanese larch is more sensitive to wind than the other species, but it grows more quickly and provides very useful farm timber. Beech will stand through two rotations of conifers and provides a degree of permeability. *Pinus contorta* is the best pine for dry, poor conditions under severe exposure, while, finally, in extreme conditions of exposure on acid soils in very wet areas, Sitka spruce is the most suitable.

For agricultural belts the choice is much wider—in fact, too wide to cover in the course of a short article. But generally it may be possible to grow a species such as Douglas fir in dingles or on suitable waste ground, or poplars along watercourses.

Special caution is necessary in the use of the following species for shelter-belts:

European larch—Too unreliable and exacting in its requirements.
Norway spruce—Except for frost hollows or on low ground, Sitka spruce is preferable.
Corsican pine —Although ideal for direct sea exposure, it should not be used on high land in areas of heavy rainfall.
Scots pine —Suitable for moderate inland conditions, but must not be used under direct sea exposure.
Ash —A greedy tree, taking much out of the soil. It is late flushing and not very suitable.
Birch —Can be used as a "nurse," but is too short-lived and thin-foliaged to make good shelter.

For the shrub layer, thorn, holly, bird cherry, spiræa or rhododendron may be used. The last-named is cheap, easily raised and needs no pruning, but it spreads quickly and may be injurious to stock.

Except on agricultural land, belts should be up to two chains wide. Where this space can be spared, Sitka spruce can be used on the windward side, with beech as a permeable core in the middle, and Japanese larch on the sheltered side to provide early growth and farm timber. *Pinus contorta* will come in on any rocky outcrops or poor soil.

Special care is needed when planting shelter-belts. Since the trees have to withstand very adverse conditions, they need every possible assistance. Thus it is essential to fence against stock and rabbits (if present). Ploughing at 5 feet spacing is desirable, planting being done on top of the furrow in wet districts and in the bottom in dry areas. All wet places must be thoroughly drained before planting, and good stocky (not too large) seedlings should be used. An application of 1 oz. ground mineral phosphate per plant is very beneficial. The plants must be kept free from weeds. Failures are usually due to the use of poor plants, careless handling, inadequate drainage, or damage by stock.

W. A. Cadman

The writer of this note is the author of *Shelter Belts for Welsh Hill Farms*, Forestry Commission Record No. 22, which is obtainable from H.M. Stationery Office, or through any bookseller, price 2*s*.

The Mechanic on the Farm: 14. Safety in the Workshop Time spent in the workshop to maintain machinery in good order can help considerably in keeping down accidents to workers in the field. But the workshop itself can have its dangers unless a few precautions are observed. It is easy to stumble over some obstruction or slip on an oily floor and fall against a machine, a moving drive-belt or flywheel. Such falls are especially dangerous in a small shop where a drill or mechanical saw is working, however well the machine may be guarded. Patches of oil should therefore be wiped away as soon as they appear on a floor, and a broom should be used frequently to sweep up the floor litter. A slippery patch on the floor can sometimes be remedied with a sprinkling of plaster of paris.

The tendency to slip depends very much on the kind of boots the worker is wearing and whether or not the soles are clean. On some floors, wet rubber boots cannot get a grip; on others, heavy leather boots with metal on the soles and heels slip dangerously. It is, of course, impracticable to change footwear when only a few minutes are to be spent in the workshop, but it is as well to remember that care must be taken, in particular when the wearer has come from a muddy field straight on to a concrete floor.

Lighting in the shop is important. There should always be a good general light, as well as the local light given by an inspection lamp. The lighting itself must be safe; the steel cage guarding portable electric lamps at mains voltage must be securely connected to an earth wire, and oil lamps must be placed where they will not be knocked over.

Pieces of metal to be drilled with a pillar drill should be positioned on the drill platform in such a way that their movement is restricted, because if the drill sticks the material may suddenly turn with the bit and strike the operator's hands. Nor should an operator stand in a direct line with rapidly rotating machines from which turnings or shavings may fly, or from which parts may become detached. When a lathe is to be used, the key which opens and shuts the chuck should never be left inserted in one of the sockets: it may fly out and injure the worker. The drive to drills and other power-driven machines should always be switched off or the belt disconnected before servicing or repairing is attempted.

Tools with broken or splintered parts should be repaired or thrown away. Chisels, hammers or other tools on which the heads have become mushroomed should not be used, for the rounded surface can cause any off-centred blows to glance off. Only spanners of correct size for the nut should be used: ill-fitting spanners can fly off the nut and cause bruised knuckles.

It is worth wearing pads or gloves when sharp-edged scrap steel or other rough materials have to be handled, and goggles are a sensible idea when the work being done involves the possibility of flying particles of metal or splashes of acid and other dangerous fluids. All nails projecting from box lids and other places where they might cause accidents should be removed.

When parts of machinery are being cleaned for reassembly, paraffin and not petrol should be used. Petrol and vaporizing oil are bad for the hands, because they wash away some of the natural protective oils, and prolonged contact with either of these fuels can cause serious skin diseases. Petrol remaining in thin layers on parts that have been cleaned also introduces risk of fire. For cleaning, it is best always to use the burning paraffin sold as lamp oil. Engines on machines being serviced or repaired should not be run in the shop when the doors and windows are shut. A through draught is necessary to prevent exhaust gases accumulating.

A fire extinguisher should be fixed just inside the door of the workshop in

such a way that it can be reached from outside, should a fire be so fierce that entry is impossible. Incidentally, the possibility of fire in the workshop is much lessened by frequent clearing-up of wood shavings and other loose material which may catch alight when a blow-lamp or other flame is used.

H. J. Hine

Museum of English Rural Life It was four years ago that the seed of an idea for the establishment of a museum of English rural life was sown at the University of Reading. On April 27, 1955, the Museum was opened in Whiteknights Park by Sir Keith Murray, Chairman of the University Grants Committee, in the presence of the Right Hon. Viscount Templewood, Chancellor of the University, Sir Leigh Ashton, Director of the Victoria and Albert Museum, Mr. J. F. Wolfenden, Vice-Chancellor of the University, and some 400-500 guests.

There is a risk in the revolution which the present age of power and mechanization has brought to the countryside that the old crafts, the old tools and the old ways of life, both on the farm and in the kitchen, may pass into the shades unremarked and unrecorded. We ought never to be so dazzled by the brightness of present achievement as to overlook the feebler light of the earlier skills which prompted and promoted that advance.

This new museum, therefore, deserves the strongest support which both urban and country folk can give it, to preserve and enlarge the present collection to a comprehensiveness that will make of it an important adjunct to the student and research worker, a well of interest to generations yet unborn, and a national treasury of which we can be justly proud.

The initial display in Whiteknights House and outside buildings embraces many diverse items, large and small, relating to husbandman and housewife, beast and burden, forestry and fishing, crafts and customs. Members of the Museum staff and many friends throughout the country have rescued valuable material from obscurity and decay, and it is hoped that others will also be able to help similarly. But the work of the Museum is by no means limited to the collection, conservation and display of exhibits; it is also a national centre for gathering together information on all aspects of its subjects, including photographs, books and first-hand accounts of processes no longer common in the countryside.

The Museum is open to the public at the following times:

May 1–October 31	Tuesday–Saturday, 10.30 a.m.–5 p.m. Sunday, 2.30 p.m.–5 p.m.
November 1–April 30	Wednesday and Saturday only 2.30 p.m.–5 p.m.

Royal Horticultural Society Flower Shows

Flower-growers within easy reach of London have an excellent opportunity of seeing really splendid specimens of the horticulturist's art in the two-day shows which the R.H.S. holds regularly every fortnight throughout the year in the New and Old Halls, Vincent Square, Westminster, S.W.1. The price of admission is 4*s*. on the first day, and 2*s*. on the second day (free to members). The dates of the shows can be obtained from the Secretary of the Society at Vincent Square.

IN BRIEF

Sheep on Salisbury Plain

In the May issue of *The British Farmer*, Mr. Ralph Whitlock looks at sheep-denuded Salisbury Plain. Cattle and poultry are there in good numbers, but sheep, which until the early part of this century were traditional to the thin chalk area of South Wiltshire, are now sparse indeed. The question is—which breed? Since both the Wiltshire Horn and the Hampshire Down have proved unsuitable, we shall have to look elsewhere. Mr. Whitlock suggests the Clun may be a likely choice, or Halfbred ewes from the north crossed with Down rams (usually Suffolk). He concludes: "One of the difficulties is that the local stocks of sheep have fallen so low that there is next to no opportunity for replenishing the supply from local markets. It is a matter of going farther afield and bringing in sheep from other districts, a procedure which, for farmers, has all the disadvantages of the unfamiliar.

"However, sheep there ought to be and sheep there probably will be on Salisbury Plain. Already the numbers are increasing a little, but it will take years to fill the huge empty spaces and bring back the days of prosperity such as when, in my father's boyhood, 50,000 sheep were penned annually at Salisbury Fair or when, even farther back (in the eighteenth century when the £ was worth goodness knows what by present reckoning), sheep farmers from Wiltshire and Hampshire took home £300,000 from the fair at the little town of Weyhill."

Butter from Cold-stored Frozen Cream

Twelve dairy plants in the Netherlands have been experimenting in butter-making with cold-stored frozen cream. A large part of Dutch butter production occurs in the flush season, and the butter is stored for later sale. A number of importers of Dutch butter indicated that they did not want cold-storage butter. As a result, the Dutch decided to test the storing of cream, instead of butter, and to make butter as the need arose.

The butter made from the stored frozen cream is reported to have the same taste as fresh butter, and in addition it has a higher vitamin A content and spreads more easily.

Sodium Metabisulphite in Silage-making

Small-scale trials at the National Institute for Research in Dairying, Reading, in the use of sodium metabisulphite as an additive in silage-making promise well. American experience is not of much value in this instance, because of the difference in the way silage is made there, but if under our own conditions we get similar results we can look forward to a well-preserved product with less loss of nutrients. To be fully effective, metabisulphite must be intimately mixed with the green crop and, while this is easily done with chopping machinery, it may be much more difficult in a pit or clamp being filled with unchopped material; uneven distribution reduces the value of metabisulphite. This additive is also likely to be much less effective when the silage material is very wet. Under these conditions seepage from the soil is considerable and most of the soluble metabisulphite will be leached out. Thus a covering to the silo is of the greatest importance. The usefulness of metabisulphite is also reduced if the temperature of the silage is allowed to rise abnormally through filling too slowly or because of lack of consolidation.

IN BRIEF

A number of farm-scale trials are planned for this coming season, as a result of which it is hoped that definite recommendations can be made.

Italy's Agricultural Problem

Although as much as 42 per cent of Italy's total labour force is engaged in agriculture, the agricultural income accounts for only 28 per cent of the total national income. The problem is how to secure greater productivity. Sig. Maurizio Parasassi examines the question in an interesting article in *The Financial Times Survey "Italy"*, published in May. "The great density of Italy's agricultural population, which holds up mechanization and inflates costs, can only be lessened by the absorption into industry and services of the under- or unemployed agricultural workers", he says. Since the war, Italy's population has increased by some 10 per cent, and living standards have gone up, markedly in the case of milk and vegetables.

Last year, 26,000 tractors were added to Italian farms, but the greater the mechanization the higher is the labour displaced and needed to be absorbed in other activities. "Every programme aimed at developing agricultural production brings with it a reduction in employment for the agricultural labour force, and so such programmes must be set in the context of overall economic development in Italy. Moreover, the absorption of the agricultural labourer in industry or commerce does not immediately affect agricultural productivity; it first reduces rural unemployment and only later relieves the pressure on productivity. In Italy, permanent agricultural unemployment has a limited importance: more grave is hidden unemployment or under-employment."

Russian Comfrey

Recent trials in Great Britain and overseas suggest that Russian Comfrey might prove a useful smallholder crop for feeding to pigs and poultry. The plant is a perennial and, when established, produces a large bulk of foliage rich in protein and low in fibre. Successive cuts in the British trials averaged 25 tons per acre, but such yields depend on good management, and once established it is hard to eradicate. There is also the point that the plant is a perennial, and as such may not be too easy to fit into a rotation.

So far, there is little information on conservation of Russian Comfrey, but methods of drying and silage-making are being investigated.

A.I.—A Living Museum

"We are all aware of the prospects which the frozen semen development has opened up to the private breeder who wishes to preserve certain strains for short or long periods. How long the latter may be we do not know. Semen was first frozen about three and a half years ago and it appears to be as good today as when it was laid down. If it will stay alive and fertile for fifty or a hundred years—and soon we shall start storage experiment to test this, with improved refrigeration at very low temperatures—we shall be able to maintain 'a living museum' of blood lines set aside against future needs . . .

"There is a good prospect also that ovarian tissue, ova or fertilized eggs may be preserved in the same way, so that 100 years from the start of the 'living museum' our descendants, having opened the bank, may see, after a further nine months, full brothers and sisters to our cattle of today. This

should provide a very nice test of the amount of breed development achieved over the period."

Dr. Joseph Edwards, at the Farmers' Club. 2nd May, 1955

Flowers and Viruses

The virus, or viruses, of tobacco necrosis is now causing concern among tulip-growers. Its method of spread is unusual, since no insect vector is involved; but it is soil-borne, the virus entering the plants by the roots. The tulip variety *Korneforos* appears to be the most sensitive and shows the greatest damage. It has been suggested that infection may take longer to reach the leaves than the growing period of the plant, so that infected plants may go unsuspected until the following year: in the meanwhile it will have been a source of contamination. This virus is widespread in Holland, where it also attacks French beans, and has also been recorded in Germany and the U.S.A.

The so-called "parsley leaf" disease seen among anemones in the south-west of England seems to be associated with three viruses which cause mottling and other blemishes—a latent virus, a tobacco necrosis virus which is probably symptomless, and a strain of the aphid-transmitted Cucumber Mosaic.

Summer Liming is Cheaper

Until September 10 the cost of deliveries of agricultural lime carries a subsidy of 70 per cent, instead of 60, as well as the usual spreading subsidy. After last year's wet weather and the consequent washing of lime from the soil, there are heavy arrears in liming that should be made good. Spreading machines can work without getting into difficulty, and it is much easier to get on to wet or hilly land in summer. There is no need to make a special application for the subsidy; when the usual claim form is sent in, the extra payment will be added automatically.

Separated Milk for Piglets and Chicks

If you are making full feeding use of separated milk for your pigs and poultry, make sure that it is always fed at the same degree of acidity; it is usually simpler to feed it sour. Also, unless the milk has been pasteurized or is definitely known to be free from tubercular infection, heat it up to boiling point before you use it. The young pigs (say, 3-8 weeks old) should have first consideration, feeding *ad lib.* up to weaning, in conjunction with a dry creep feed in a separate trough.

For chicks under a week old, a start can be made with 1 quart of separated milk per 100 birds, diluting it with an equal amount of water. Thereafter, up to 8 weeks, daily quantities can be increased, without dilution, to 1½ gallons per 100 chicks.

British Association Meeting

This year's meeting of the British Association for the Advancement of Science is to be held at Bristol, from August 31 to September 7. The President will be Professor Sir Robert Robinson, O.M., F.R.S. The Agriculture Section will be under the presidency of Mr. W. B. Mercer, C.B.E., formerly Director of the West Midland Province of the N.A.A.S.

BOOK REVIEWS

The Farming Kingdom. NIGEL HARVEY. Turnstile Press. 15*s*.

Mr. Nigel Harvey is a well-known writer on agriculture, and in *The Farming Kingdom* he provides a book which is badly needed. It is best described by quoting from Sir James Scott Watson's foreword: ". . . a faithful and a vivid picture of our country's farming . . . It is important that the ninety-four per cent of our people who follow other walks of life should know something of the doings and the problems of the six per cent who provide half their daily food".

A wealth of information is assembled in this book in a refreshingly simple, straightforward manner which should appeal to the general reader, whether or not he has any previous knowledge of farming. Most of us eat some 87,000 main meals in the course of a lifetime, and it is as well therefore that we should have some understanding of the means by which " the farming kingdom " provides our daily bread.

The author analyses the three things that go to make a farm—the land itself, the farmer, the tools, including plants and animals, which he uses—and then considers the goods the farmer has to sell. The history of farming in Britain is dealt with from Saxon times onwards in order to show the pattern through which modern farming has evolved and into which new techniques must be fitted. An important point is that the past influences and shapes the future; hence the study of history is of great practical value in deciding appropriate future developments. Mr. Harvey is at pains to emphasize that the farmer is not king of the farming kingdom. It is the food consumer who rules and must be obeyed, in that he decides what he will or will not buy.

The book is a model of conciseness and will give to farmers a basic understanding of how their patterns of farming evolved, how they may develop, and the general position of agriculture in the country's economy. Farmers should not only read *The Farming Kingdom* themselves but encourage the reading of it by their town-dwelling friends, who are apt to forget that food is not just something to be taken effortlessly from tins consigned from overseas.

Well illustrated with photographs presenting many interesting contrasts between the old and the new, this book makes a real contribution to our understanding of a complex industry.

G.O.

The Geography of the Flowering Plants (2nd Edition). R. GOOD. Longmans, Green. 50*s*.

Plant geography is the study of the distribution of plants throughout the world and its correlation with external conditions. The plant world is basic to the economy of man, and the distribution of the flowering plants has been a controlling influence in the development of mankind throughout history. The author stresses such aspects of the study in his introduction.

The first edition of this book, although published as recently as 1947, was actually written by 1939. It was brought up to date, as far as possible, before publication, but it was essentially an account of the knowledge of the subject as it existed before the Second World War. Many new facts concerning the distribution of plants have come to light in recent years and have been incorporated in this complete revision. Some chapters have been almost entirely rewritten, but the general approach to the subject and the layout of the book remain unchanged.

After considering the geography of the world—its continents and oceans, islands, mountains, deserts, etc.—the author divides the world into thirty-seven floral regions, and in later chapters the subject-matter is arranged, where appropriate, under these regions. The distribution of the flowering plants is studied in increasing detail, dealing first with families, then genera and species throughout the world, then the distribution of plants in a comparatively small country—the British Isles—and finally in the county of Dorset. Part I of the book ends with an account of the geological history and past distribution of the flowering plants. Part II deals with the factors affecting or controlling distribution—climatic changes, edaphic factors (that is, the variables influencing the plant through its physical contact with the soil), geographical changes, the dispersal of plants—and considers how these factors can be arranged to provide a theoretical explanation of the facts of plant geography in the "theory of tolerance".

The whole book is a comprehensive account of the distribution of plants, as we know it today, and how and why such a state has come to be. It makes pleasant reading, as well as being a book of reference. Its careful explanation of technical terms makes it intelligible to anyone interested in plants, whether a trained botanist or not.

B.J.Y.

BOOK REVIEWS

Practical Plant Protection. E. HOLMES. Constable. 15*s*.

This book is written for the average British grower and is intended to be a review of the best plant protection practices available to him. It should in fact be read by every grower who wants to keep his crops reasonably free from diseases, pests and weeds, as well as by the advisory officer, the specialist and the teacher, for all of them will be able to profit from it in one way or another. The author has had a long experience of the problems of the research worker, the plant pathologist and the farmer alike: and his text is authoritative, always very much to the point, and easy to read.

The early chapters are general and deal with methods used in plant protection, the kinds of products used, the ways in which they are formulated for marketing, and the government scheme for official approval of proprietaries. These are followed by ninety pages devoted to the principal pests and diseases of crops grown in arable and grassland, market garden, glasshouse, orchard and hop yard. There is a very helpful and valuable section on weed-killers and weed control. Other chapters deal with diseases caused by viruses, eelworms and mineral deficiencies; with land pests; methods of application, including contract work; and with a balanced view of the safe handling of toxic chemicals and their effect on wild life.

The author is concerned mainly with those insect pests and fungus diseases which can be controlled by chemical means, and this has led to a certain unevenness in treatment. The phrase "practical plant protection" connotes more than chemical control, and one would expect to find greater emphasis given to the importance of crop rotations and plant breeding for resistance, to say nothing of the official health certification schemes for controlling virus diseases of potatoes, fruit and hops. For instance, the best way to avoid serious loss from root eelworm in potatoes is still by adequate rotation, and growers who rely on seed treatment to get "a large measure of protection" from Take-all are likely to be disappointed. The economic significance of Wart Disease of potatoes changed considerably with the breeding and cultivation of immune varieties, and the certification schemes have done more than anything else to reduce the incidence of Leaf Roll and Severe Mosaic in potato crops. It is doubtless because no adequate control measures are known that no mention is made of such important diseases as Clover Rot, Downy Mildew of sugar beet, and Red Core of strawberry, but it is less easy to understand the scant attention given to the pests and diseases of ornamental plants.

W.C.M.

Grasses. C. E. HUBBARD. Penguin Books. 3*s*. 6*d*.

"It is estimated that there are between 150 and 160 species of grasses indigenous or naturalized in the British Isles; 152 of these are illustrated in this book." So says the author of *Grasses* in describing the field he has covered. And this phrase is very indicative of the comprehensive nature of the whole book. Each species described has two pages to itself. One page gives an excellent illustration of all the morphological features of the plant, with the important distinguishing features enlarged and drawn in detail, thereby enabling a beginner to identify the species without any reference to the many keys. On the opposite page there is a full description of both vegetative and floral characters, the type of soil and condition under which one could expect to find the plant, and comments on its economic importance.

Apart from these detailed descriptions there is a great deal of other information designed to help the student to get to know his grasses better. One chapter, for example, groups the grasses according to their habitat, thus reducing the number of species that the student will have to consider in a particular locality. There is, too, a section dealing with the uses of grasses, and for this purpose the subject is split into four major groups: cereals, herbage, lawns, and ornamental. Here, the agriculturist will find a reference to all the major grasses and their uses, with an up-to-date reference to the newer strains on the market. The reader who is interested in the grasses which are used or appear as weeds in lawns or playing turf, will not only find a note as to their particular purposes, but also a special key to enable him to identify them.

There are three other keys in this book, all of which are simple to follow. The main one covers the whole range of grasses and provides a speedy means of identification—a feature which the more experienced student will greatly appreciate. The second key distinguishes the commoner grasses by their vegetative characters, while the third, which is concerned solely with the identification of grass seeds, will immediately appeal to the farmer or gardener who buys grass seeds in a "mixture" and who may wish to identify the separate ingredients. The glossary gives a good description of the meanings of the various technical terms used, and there are indexes to botanical and common names.

It will be apparent from all this that *Grasses* is assured of a wide appeal. For the farmer of today, who is more interested than ever in his grassland, it should prove invaluable, for not only will it help him to get to know his grasses, but it will also give him a good indication as to their usefulness. For the would-be farmer of tomorrow, it is just the type of book to stimulate interest in the competitions in the identification of grasses which are becoming so valuable a feature of Y.F.C. functions. Finally, for the student or teacher it should prove an essential reference book, with the added attraction that it is offered at a price which all can afford.

O.G.W.

Sedgemoor and Avalon. (Regional Books Series). DESMOND HAWKINS. Hale. 18*s.*

Sedgemoor and Avalon, Glastonbury and Athelney—this surely is haunted country, and at first sight it is haunted by the tradition of defeat. Here Arthur fought in a doomed cause. Here Alfred sought refuge from the victorious Danes. Here the greatest of English abbots hung at the gate of his monastery at the orders of an upstart servant of an upstart secular authority. Here the armed power of the Commons of England, for centuries the ultimate factor in the government of the realm, was finally defeated and sent down into history by the forces of a new military order. Here the Bloody Assizes left memories which made it unsafe for the great-grand-daughter of Judge Jeffreys to enter Bridgewater. Yet this is only half of the story which Mr. Hawkins tells us so pleasantly. The other half, less romantic, more practical and far more heartening, shows the manner in which *Homo sapiens et faber* exploits or controls his physical environment.

Nature intended much of this area to be marsh and lagoon. In ancient times, man was prepared to accept this dispensation, though he laboriously turned it to his own advantage by building the astonishing Lake Villages which have been excavated in the last half-century. Then came the monks, wealthy and purposeful landowners, who first undertook the great drainage schemes which altered the face of the landscape. They, in turn, were followed by the enclosers and the canal-builders—incidentally, Bagehot, a man almost too sensible to be true, learned his economic trade in a Langport canal-office. To this day, too, the cultivation of withies and teazles and the cutting of peat continue to illustrate the patient cunning with which man studies and wins the conditional offerings of local nature. These enterprises also illustrate the effects of geography on society, for they remain in the hands of share-croppers, landless but highly skilled mastermen who have added greatly to the flavour and variety of village life.

Mr. Hawkins makes no claim to the more forbidding type of scholarship. But he writes agreeable, adult prose and avoids both the sentimentality and the shoddier kind of local lore which disfigure so many "country books". His knowledge is considerable, his interests wide, and he has a well-developed flair for such pleasingly peculiar items as monastic lavatories, cormorant fishing, the Iron Age dice with two sixes on it, and the surrealist (but effective) machine for writing Latin poetry which he found at Street. Nevertheless, he keeps the quaint and the picturesque firmly in their proper place, and the result is a guide book to West Somerset of real value as well as real charm.

N.H.

Cost and Returns of Wheat Growing in 3 Areas of South West England, 1953. (Department of Economics, University of Bristol, Report No. 82). S. T. MORRIS. 1*s.* 6*d.*

Wheat has never been a very popular crop in the South-West, nevertheless there are districts in Dorset and Devon in particular where it can compete successfully with other farm crops. This essentially is the conclusion to be drawn from the figures presented in this Report.

Perhaps the most interesting facts to come out of the survey, which involved a total of 1,942 acres on 72 farms, relate to the effects of the different farming practices of each area. For example, it is shown clearly that where production is on a relatively large scale and is mechanized (and here Dorset may be contrasted with Devon and Cornwall), considerable economies may be achieved and the competitive position of the grower may be made very strong. On the other hand, the results show also that a large part of the benefit of these economies may easily be lost through a fall in either grain or straw yields.

M.M.

BOOK REVIEWS

Thames Estuary (Regional Books Series). WILLIAM ADDISON. Robert Hale. 18*s.*

Thames Estuary differs from most of its companions in the Regional Books series in one vital respect—that the area it describes lays no claims to beauty, at least not in the commonly accepted aesthetic sense. It is possible that the river-dweller or the voyager returning after long absence may find a peculiar attractiveness about its flat, featureless terrain, giving way, as the river narrows, to dingy warehouse, blackened timber and brick, and rusty iron, but to most of us it is merely a bustling, smoke-burdened symbol of London's maritime importance.

Mr. Addison, however, is obviously a lover of the river and its environs. That fact stands out in the first few pages of his book, but it is most evident when he is dealing with the ancient smuggling activities of the Essex marshland or the pubs and steps of Dockland. He is, of course, following in distinguished footsteps. Chaucer, Dickens, Defoe, Pepys, W. W. Jacobs, Hogarth and Scott—to mention only a few—have all recorded the activities of the area in their own particular way. That the author is not unaware of this background is shown by the extensive bibliography added to his book, and frequent quotations from such authorities within its pages.

Wisely, the author has not attempted to draw a purely historical picture. Nevertheless, a good deal of history is skilfully woven into the narrative. In our voyages down and around London's river he recalls for us battles long since forgotten, defence works built and destroyed, invaders who came from the open sea to plunder and defile, missionaries who arrived at the same time as the marauders to establish their churches. The Tower of London, from which Henry VIII's polar bear took his daily swim in the river, the ancient fisheries of Barking and Leigh, the building of Greenwich Palace, the pilgrim paths through Rochester to Canterbury, the rowdy, ribald roystering in the mean streets of Wapping in the seventeenth century—all this, and a thousand more reminders of the past, fit naturally and unobtrusively into this fascinating, and at times diverting, account.

The Thames Estuary is defined officially as the sixty miles of waterway between London Bridge and the Nore, but for the purpose of this book it also includes the Essex marshes and coast up to Burnham-on-Crouch, and the Kent bank to Sheppey and the Medway. For all those who live within this area, I can confidently recommend Mr. Addison's book. It will provide hours of absorbing reading and, unless I am much mistaken, a wealth of new information. For those who reside outside, it may well offer an insight into the character and background of the people of this highly commercialized and industrialized region.

L.W.T.

Autosexing Annual, 1955. Autosexing Breeds Association. 1*s.* 6*d.*

After an enforced absence of one year the Autosexing Annual re-appears for 1955 and records the activities of the Autosexing Breeds Association. It contains some interesting and helpful articles and a tribute to the late William Powell Owen. The standards for Legbars, Dorbars, Cambars, Silver Welbars, and Brussbars, as approved by the Poultry Club at different times, are given in full detail. There is also a list of the members of the Association, together with the breeds which they keep.

W.M.A.

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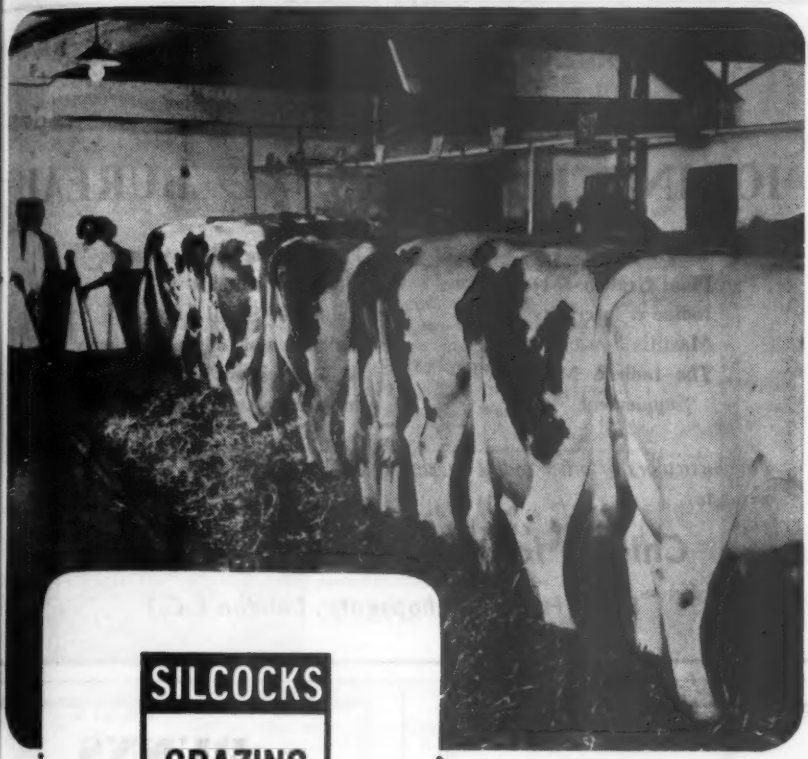

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The Editor

The Agricultural Review is under the general editorship of Sir James Scott Watson. He recently retired from one of the top agricultural posts in Britain—Chief Scientific Adviser to the Ministry of Agriculture.

Writing in the first issue

PROFESSOR WAIN of Wye College—on his recent discovery in Chemical Weed Control.

DR. HUDSON, head of the Commonwealth Bureau of Plant Breeding—on current work in sugar beet improvement.

DR. D. P. CUTHBERTSON, Director of the Rowett Research Institute.

PROFESSOR K. L. ROBINSON of Queen's University, Belfast.

DR. R. COLES on Baled Silage.

S. R. WRAGG of Bristol University—on The Farm as a business.

J. C. MURDOCH of the National Institute for Research in Dairying—on Additives in Silage-making.

Among contributors to later issues

DR. J. HAMMOND, lately Director, Unit of Animal Reproduction and Reader in Animal Physiology, School of Agriculture, Cambridge.

W. A. POOL, retiring Director, Commonwealth Bureau of Animal Health.

DR. R. BRAUDE & MR. J. C. MURDOCH of The National Institute of Research in Dairying.

G. C. JOHNSON, lately Deputy Provincial Director, Eastern Province, National Agricultural Advisory Service.

C. H. BLAGBURN, Department of Agricultural Economics, Reading University.

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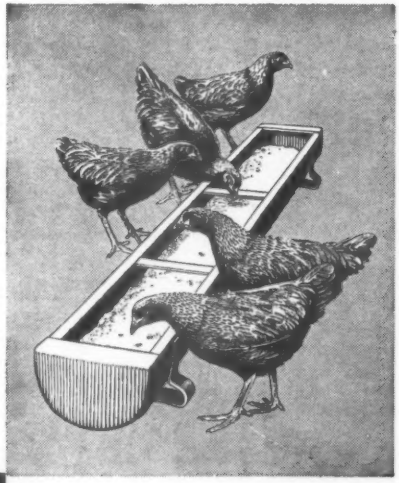

Bath & West Show. Stand 91, Ave. D.

Ask your local merchant for his delivered-in prices (with or without penicillin).

AGRICULTURAL FOOD PRODUCTS LIMITED,
23 Upper Mall, London W.6., and Saltney, Chester.

Whatever you own there is no waiting for electrical repairs if you use the Lucas "B90" Scheme which has been created to ensure that you, the farmer, need not lose valuable time waiting for electrical repairs. It is an exchange scheme by which any item of Lucas Equipment — Magneto — Distributor — Starter — Generator, etc., which has developed a fault through service can be exchanged for a complete factory reconditioned unit, at a cost comparable with a normal repair. This means that you get a unit as good as new covered by the full Lucas guarantee, and the time taken to execute a repair is no longer than it takes to obtain and fit the replacement part. Time saved is money saved; make full use of the Lucas 'B90' Exchange Service Scheme through your nearest Lucas agent — he is ready to help you.

THE QUICK REPAIR SERVICE

for LUCAS ELECTRICAL EQUIPMENT

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